JAIPURIA INSTITUTE OF MANAGEMENT
LUCKNOW NOIDA JAIPUR INDORE

JAIPURIA INSTITUTE OF MANAGEMENT, NOIDA
PGDM / PGDM (M) / PGDM (SM)
THIRD TRIMESTER (Batch 2024-26)
END TERM EXAMINATIONS, APRIL 2025
REAPPEAR EXAM

Course Name	**Operations Research**	Course Code	**20521**
Max. Time	**2 hours**	Max. Marks	**40 MM**

INSTRUCTIONS:
a. All questions are compulsory.
b. Use of calculators (simple/ scientific) is permitted.

Q.1. In the vibrant city of Jaipur, known for its bustling streets and historical landmarks, the local transportation authority is tasked with optimizing the delivery routes for a new fleet of electric buses. These buses are set to navigate the city's dense urban landscape, delivering passengers efficiently while minimizing travel time. The city's transport network can be visualized as a series of nodes representing major bus stops or junctions. The primary bus depot, located at the outskirts of the city, serves as the source node from which all routes originate. From this depot, roads branch out to connect five additional nodes: the iconic Hawa Mahal, the bustling Johari Bazaar, the serene Central Park, the educational hub near Rajasthan University, and the popular Amer Fort, which serves as the destination node.

Specifically, the network is composed of the following roads with designated travel times: from the depot to Hawa Mahal (10 minutes), to Johari Bazaar (12 minutes), and to Central Park (15 minutes). Hawa Mahal connects to Johari Bazaar (8 minutes) and Rajasthan University (10 minutes). Similarly, Johari Bazaar links directly to Central Park (5 minutes), and from Central Park, buses can proceed to Rajasthan University (7 minutes) and Amer Fort (12 minutes). Finally, Rajasthan University connects directly to Amer Fort within 10 minutes, while Hawa Mahal offers a direct, scenic route to Amer Fort taking 20 minutes. The network of roads connecting key locations across Jaipur that the transportation authority must decipher to determine the shortest routes. On behalf of the transportation authority formulate the given problem as shortest path problem. **(8 Marks)**

Q.2. Fashion Fusion, a leading retail brand in India, is planning to launch a new seasonal clothing line for the festival season, facing uncertainty in market demand. The management is considering five production quantities: 1,000, 2,000, 3,000, 4,000, and 5,000 units, while estimating demand scenarios ranging from low (1,000 units) to maximum (5,000 units). Each unit costs ₹500 to produce and sells for ₹800. Unsold units incur a disposal cost of ₹200 each. To make a strategic decision, construct a payoff matrix by calculating potential profits or losses for each combination of production quantity and demand scenario. Using the matrix and following the criteria of rationality, choose the appropriate production quantity to be produced by Fashion Fusion. **(8 Marks)**

Q.3. In the Indian aviation market, two major airlines, FlyHigh and SkyJet, are competing for passenger share on a popular domestic route. Both airlines consider strategic pricing options: low, medium, and high fares. The following is the payoff matrix that reflects various positive and negative outcomes for FlyHigh choices.

	S1 (Low Price)	**S2 (Medium Price)**	**S3 (High Price)**
F1 (Low Price)	6	5	10
F2 (Medium Price)	-5	2	6
F3 (High Price)	-10	6	1

Determine optimal pricing strategies and the value of the game within this competitive landscape.

(8 Marks)

Q.4. In the competitive world of online streaming services in India, two major players, StreamNest and FlickFlow, dominate the market. Currently, StreamNest enjoys a 70% market share, while FlickFlow holds the remaining 30%. Each month, a predictable shift occurs: 10% of StreamNest's subscribers switch to FlickFlow, and 20% of FlickFlow's users move to StreamNest. To anticipate long-term trends, both companies want to analyze brand switching patterns and calculate their market shares at equilibrium. Examine the share for each firm at steady state. **(8 Marks)**

Q.5. Solve the following LPP using the appropriate method:

Max $z = 5x + 3y$
s.t.
$x + 2y \leq 14$
$3x - y \geq 0$
$x - y \leq 2$
$x, y \geq 0$

(8 Marks)