Roll No……

GL BAJAJ
Institute of Management & Research. PGDM Institute
FIND YOUR SPARK
GREATER NOIDA (Approved by A.I.C.T.E., Ministry of HRD, Govt. of India)

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POST GRADUATE DIPLOMA IN MANAGEMENT (2024-25)

END TERM EXAMINATION (TERM -III)

Subject Name: **Decision Science** Time: **02.00 Hrs.**

Sub. Code: **PG35** Max Marks: **40**

Note: All questions are compulsory. Section A carries 12 marks: 6 questions of 2 mark each, Section B carries 18 marks having 3 questions (with internal choice question in each) of 6 marks each and Section C carries 10 marks one Case Study having 2 questions of 5 marks each.

SECTION - A

Attempt all questions. All questions are compulsory. **2×6 = 12 Marks**

Q. 1: (A). How does Decision Science contribute to effective decision-making in business management? Discuss its significance and demonstrate its role with two practical examples from a managerial context.

Q.1: (B). In a simultaneous throw of two dice, find the probability of getting a total of 6.

Q. 1: (C). What are Slack and Surplus Variables in Linear Programming? Explain their significance with a practical example.

Q. 1: (D). A firm is considering three investment options under varying economic conditions. The payoff table (in ₹ '000s) and probabilities of each economic condition are given below:

Investment Option	**Growing (0.3)**	**Stable (0.3)**	**Recession (0.4)**
Stocks	100	500	-200
Bonds	300	300	200
Mutual funds	200	300	400

Compute the Expected Monetary Value (EMV) for each investment option. Which investment option should the firm select under the EMV criterion? Briefly justify your answer with a managerial interpretation**.**

Q. 1: (E). What are the Optimism, Pessimism, and Regret criteria in decision-making? Explain their significance and how they influence managerial decision-making under uncertainty.

Q. 1: (F). What are Saddle Point, Pure Strategy, and Mixed Strategy in Game Theory? Explain their significance and role in strategic decision-making."

SECTION - B

All questions are compulsory (Each question has an internal choice. Attempt any one (either A or B) from the internal choice) **6 x 3 = 18 Marks**

Q. 2: (A). How do linear programming techniques facilitate decision-making in Decision Sciences, and what is their fundamental role in enhancing managerial effectiveness?

OR

Q. 2: (B). Solve the following Linear Programming Problem either by simplex or Graphically

Maximize $Z = 6X_1 + 5X_2$

Subject to

$$X_1 + X_2 \leq 5$$
$$3X_1 + 2X_2 \leq 12$$
$$X_1, X_2 \geq 0 \text{(Non-Negative Restrictions)}$$

Q. 3: (A). A firm operates manufacturing facilities at three locations: A, B, and C, with respective daily production capacities of 30, 40, and 50 units of a specific item. The firm also maintains warehouses at four locations: P, Q, R, and S, with corresponding daily demands of 35, 28, 32, and 25 units. The transportation cost per unit for different routes is provided in the following cost matrix:

Destination						**Supply**
Source		**P**	**Q**	**R**	**S**	
	A	6	8	8	5	30
	B	5	11	9	7	40
	C	8	9	7	13	50
Demand		35	28	32	25	

Find the Initial Feasible Basic Solution (IFBS) and Total minimum cost by Vogel's Approximation Method.

OR

Q. 3: (B). Explain the concept of a two-person zero-sum game in Game Theory. Distinguish between pure and mixed strategies with suitable examples. Further, elaborate on the concept of rule of dominance and how it helps in solving such games.

Q. 4: (A). A production supervisor is considering how he should assign the four jobs that are to be performed by four of the workers. He wants to assign the jobs to the workers such that the aggregate time to perform the jobs is least. Based on previous experience, he has the information on the time taken by the four workers in performing these jobs as given below. Find the total minimum time for completing the job and also write the interpretation of the result.

	Jobs					
		I	**II**	**III**	**IV**	**V**
Workers	1	13	8	16	18	19
	2	9	15	24	9	12
	3	12	9	4	4	4
	4	6	12	10	8	13
	5	15	17	18	12	20

OR

Q. 4: (B). In a two-person zero-sum game, Player A and Player B have the following payoff matrix. Each player aims to maximize their own outcome while minimizing the opponent's. **Use the dominance rule to reduce the matrix if possible and determine the optimal strategies for each player.** Also, find the value of the game and state whether the game is fair (i.e., value of the game = 0).

Payoff Matrix (for Player A):

	B1	B2	B3
A1	**1**	**7**	**2**
A2	**6**	**2**	**7**
A3	**5**	**1**	**6**

SECTION - C

Read the case and answer the questions **5×02 = 10 Marks**

Q. 5: Case Study: A manufacturing company, Tech Fabric Industries, specializes in precision components and operates a two-machine production line (M1 and M2) for various tasks. The company must process nine tasks (A–I) in sequence, ensuring an efficient workflow while minimizing idle time and total production completion time.

Problem Statement:

The production manager needs to determine the optimal order in which tasks should be scheduled across Machine 1 (M1) and Machine 2 (M2) to optimize performance and minimize total processing time. The processing time for each task on both machines is given in the table below:

Task	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
M1	2	5	4	9	6	8	7	5	4
M2	6	8	7	4	3	9	3	8	11

Q5 (A): Determine the optimal job sequence to minimize the total elapsed time using Johnson's Rule (assuming the job passes through all machines in the same order and give interpretation of the results

Q5 (B): Calculate the Total Elapsed Time, and the Idle time on each of the machines. Further advise the company on the results.

Mapping of Questions with Course Learning Outcome

Question Number	COs	Marks Allocated
Q. 1:	**CO1**	**12marks**
Q. 2:	**CO2**	**6 marks**
Q. 3:	**CO3**	**6 marks**
Q. 4:	**CO4**	**6 marks**
Q. 5:	**CO5**	**10 marks**