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)

Plot No. 2, Knowledge Park-III, Greater Noida (U.P.) –201306

POST GRADUATE DIPLOMA IN MANAGEMENT (2023-25)

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 5 marks: 5 questions of 1 mark each, Section B carries 21 marks having 3 questions (with internal choice question in each) of 7 marks each and Section C carries 14 marks one Case Study having 2 questions of 7 marks each.

SECTION - A

Attempt all questions. All questions are compulsory. **1×5 = 5 Marks**

Q. 1: (A). Explain Decision Science in Business Management.

Q. 1: (B). Define the concept of Joint and Conditional Probability with the Example.

Q. 1: (C). State the Baye's Theorem.

Q. 1: (D). Decision Making under risk. Calculate the Expected Monetary Value and write down the managerial insights from the results.

Pay-off

Course of Action	***State of Nature***		
	S_1	**S_2**	**S_3**
A_1	180	300	400
A_2	250	450	-100
A_3	0	230	230
Probability	0.45	0.25	0.3

Q. 1: (E). Explain the terms Optimism, Pessimism, and Regret criterion in 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) **7 x 3 = 21 Marks**

Q. 2: (A). What is the primary role of quantitative techniques in Decision Sciences, and how do they contribute to effective decision-making?

OR

Q. 2: (B). Solve the given Linear programming problem by the Graphically Method:

Maximize $Z = 50X_1 + 30X_2$

Subject to the constraints

$$4X_1 + 3X_2 \leq 240$$

$$2X_1 + X_2 \leq 100$$

$X_1, X_2 \geq 0$ (Non-Negative Restrictions)

Q. 3: (A). Goods must be transported from Sources O_1, O_2, and O_3 to Destinations D_1, D_2, D_3, and D_4. The Supply and Demand of the warehouses are given below:

Destination						Supply
Source		D_1	D_2	D_3	D_4	
	O_1	52	48	38	37	**250**
	O_2	40	59	52	51	**450**
	O_3	39	38	40	43	**300**
Demand		**200**	**150**	**350**	**300**	

Obtain the Initial Feasible Basic Solution (IFBS) by Vogel's Approximation Method (Penalty Cost Method) with the distribution of the minimum cost.

OR

Q. 3: (B). Explain the Assignment problem. A company's department has five employees with five jobs to be performed. The time (in hours) each employee takes to perform each job is given in the effectiveness matrix.

Jobs	Employees					
		I	**II**	**III**	**IV**	**V**
	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

How should the jobs be allocated, one per employee, to minimize the total employee hours?

Q. 4: (A). A firm is engaged in producing two products, A and B. Each unit of product A requires two kg of raw material and four labour hours for processing, whereas each unit of product B requires three kg of raw material and three hours of labour, of the same type. Every week, the firm has an availability of 60 kg of raw material and 96 labour hours. One unit of product A sold yields ₹40 and one unit of product B sold gives ₹35 as profit. Formulate this problem as a linear programming problem to determine how many units of each product should be produced per week so that the firm can earn the maximum profit. Assume there are no marketing constraints so that all produced can be sold. Furthermore, develop a Simplex table for the first initial basic table with the Key Row, column, and element.

OR

Q. 4: (B). In a two-person game with Player A and Player B, each player has a set of strategies to choose from. For Player A, the strategies are labeled A1 & A2,. Similarly, Player B has strategies labeled B1 & B2. The objective for each player is to select the optimal strategy that maximizes their chances of winning or achieving their desired outcome. Various factors must be considered to determine the best strategies for both players. These include the payoff matrix, risk preferences, information asymmetry, and potential moves of the opponent. Each strategy comes with its own set of advantages and drawbacks, influencing the overall outcome of the game.

Find the optimal strategies for Players A and B in the following game. Also, obtain the value of the game. Is the Game Fair?

		Player B	
		B_1	B_2
Player A	A_1	8	-7
	A_2	-6	4

SECTION - C

Read the case and answer the questions **7×02 = 14 Marks**

Q. 5: Case Study: **Sequencing Problem**

In the bookbinding workshop, three essential machines stand, each assigned a distinct task: one handles the printing press, another binds the pages, and the last meticulously packages the finished books. The precise durations for executing each operation—printing, binding, and packaging—are meticulously documented within this orchestrated symphony of machinery. These times serve as the guiding metrics for the workflow, ensuring efficiency and coordination among the machines. With its rhythmic whirr, the printing press sets the initial pace, transferring words and images onto pristine pages. Once imprinted, the boundless potential of these pages is realized as they journey to the binding machine, where they are neatly encapsulated, transforming loose sheets into cohesive volumes. Finally, the packaged perfection emerges from the last machine, ready to embark on its literary voyage into the hands of eager readers. Each machine, a cog in the intricate mechanism of book production, plays its role precisely, contributing to the seamless creation of literary works that will inspire, inform, and captivate readers worldwide. The times required to perform each book's printing, binding, and packaging operations are known.

Job	**A**	**B**	**C**	**D**	**E**
Machine I (Printing) (in Hours)	8	10	6	7	11
Machine II (Binding) (in Hours)	5	6	2	3	4
Machine III (Packaging) (in Hours)	4	9	8	6	5

Questions:

Q5: (A). Determine the order in which the books should be processed to minimize the total Elapsed time required to process all the books, i.e., optimal job sequences.
Q5: (B). Find out the Total Elapsed Time and Idle time for each machine.

Mapping of Questions with Course Learning Outcome

Question Number	**COs**	**Marks Allocated**
Q. 1:	**CO1**	**5 marks**
Q. 2:	**CO2**	**7 marks**
Q. 3:	**CO3**	**7 marks**
Q. 4:	**CO3**	**7 marks**
Q. 5:	**CO4**	**14 marks**