Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MBA– SEMESTER –III-EXAMINATION – WINTER-2023

Subject Code:4539271 **Date: 05-12-2023**

Subject Name: Operations Research

Time:10:30 AM TO 1:30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of simple calculators and non-programmable scientific calculators are permitted.**

Q. No.		Question Text and Description	Marks
Q.1		Define the following terms: (a) Model (b) Prohibited Route (c) Redundancy (d) Infeasibility (e) Degeneracy (f) Transition Probability (g) Saddle Point	**14**
Q.2	**(a)**	What is a linear programming model? Briefly discuss advantages, limitations and applications of a linear programming model.	**07**
	(b)	Define operations research. What are the essential characteristics of operations research?	**07**
		OR	
	(b)	Discuss the significance and scope of operations research in modern management.	**07**
Q.3	**(a)**	The mean arrival rate of cars for service at a service center is 3 per hour. The mean service time for each car is found to be 10 minutes per service. Assuming Poisson arrival and exponential service time, calculate the utilization factor and expected time a customer has to spend in the system.	**07**
	(b)	Solve the following transportation problem and calculate the total cost.	**07**

Source	Destination				
	D	E	F	G	Supply
A	21	16	25	13	11
B	17	18	14	23	13
C	32	27	18	41	19
Demand	6	10	12	15	

OR

Q.3	**(a)**	What do you understand by a queuing system? Explain the structure and performance measures of a queuing system.	**07**

	(b)	Describe the matrix form of the transportation problem. Explain how to convert the unbalanced transportation problem into a balanced one.	**07**
Q.4	**(a)**	What do you understand by Markov's Chain? Explain various characteristics and applications of Markov's Chain.	**07**
	(b)	What do you understand by Simulation? Discuss various types of simulation.	**07**

OR

Q.4	**(a)**	What is a game in game theory? Explain the theory of dominance in the solution of rectangular games.	**07**
	(b)	Discuss various steps in simulation process with the help of a queuing problem.	**07**

Q.5 **CASE STUDY:**

Consider the following LPP problem:

$$\text{Maxmize } Z = 5x_1 + 3x_2$$
$$\text{Subject to : } x_1 + x_2 \leq 2$$
$$5x_1 + 2x_2 \leq 10$$
$$3x_1 + 8x_2 \leq 10$$
$$x_1 , x_2 \geq 0$$

	(a)	Solve the above LPP by Graphical Method.	**07**
	(b)	Explain the procedure of generating extreme point solutions to an LP problem. Discuss the scenario of infeasible solution and unbounded solution.	**07**

OR

Q.5	(a)	Solve the above LPP by Simplex Method.	**07**
	(b)	What is simplex? Explain how maximization and minimization problems differ when applying simplex?	**07**

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