

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 711306N**Date: 06-01-2014****Subject Name: Decision Models in Management****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Explain – Feasible solution, Optimal Solution, Degenerate Solution **07**

(b) Solve the following LP problem graphically **07**

$$\text{Maximize } Z = X_1 + 5X_2 + 3X_3$$

Subject to

$$X_1 + 2X_2 + X_3 = 3$$

$$2X_1 - X_2 = 4$$

$$X_1, X_2 \text{ and } X_3 \geq 0$$

Q.2 (a) Write the procedure of North west corner method **07**

(b) Determine an initial basic feasible solution for the following problem using Least cost cell method. **07**

		Destination					Supply
		A ₁	B ₁	C ₁	D ₁	E ₁	
Origin	A	2	11	10	3	7	4
	B	1	4	7	2	1	8
	C	3	9	4	8	12	9
Demand		3	3	4	5	6	

OR

(b) Form the dual of the following primal problem **07**

$$\text{Maximize } Z = 4X_1 + 10X_2 + 25X_3$$

Subject to

$$X_1 + 4X_2 + 10X_3 \leq 30$$

$$4X_1 + 10X_2 + 10X_3 \leq 40$$

$$6X_1 + 8X_2 + X_3 \leq 20$$

$$X_1, X_2 \text{ and } X_3 \geq 0$$

Q.3 (a) Discuss the steps of Dijkstra's algorithm. **07**

(b) Solve the following problem using Kuhn Tucker conditions **07**

$$\text{Maximize } Z = 3X_1^2 + 10X_1X_2 - 8X_2^2$$

Subject to

$$3X_1 + 12X_2 \leq 84$$

$$X_1 \text{ and } X_2 \leq 0$$

OR

Q.3 (a) Explain the procedure of systematic method of Shortest path model. **07**

- (b) Solve the following assignment problem using Hungarian method. The matrix entries are processing time in hours. 07

		Operator				
		1	2	3	4	5
Job	1	20	22	35	22	18
	2	4	26	24	24	7
	3	23	14	17	19	19
	4	17	15	16	18	15
	5	16	19	21	19	25

- Q.4 (a) Find the initial feasible solution of the following transportation problem using Northwest corner cell method 07

		Destinations					Supply
		A1	B1	C1	D1	E1	
Origin	A	2	11	10	3	7	4
	B	1	4	7	2	1	8
	C	3	9	4	8	12	9
Demand		3	3	4	5	6	

- (b) Find the minimum spanning tree using Krushkal's algorithm 07

Arc	Distance	Arc	Distance
1-2	4	4-7	12
1-4	3	5-7	6
1-5	5	5-8	8
2-3	7	6-7	4
2-4	8	6-10	8
3-4	9	7-8	3
3-6	10	7-9	5
4-5	5	8-9	2
4-6	8	9-10	4

OR

- Q.4 (a) Cars arrive at a restaurant with a mean arrival rate of 28 cars per hour and the service rate of the cars is 20 per hour. The arrival rate and the service rate follow poisson distribution. The number of parking space for cars is only 5. Find the standard result of this system 07

- (b) Discuss the advantages of simulation in Transportation Engg. 07

- Q.5 (a) Solve the following integer linear programming problem optimally 07
 Maximize $Z = 2X_1 + 5X_2$
 Subject to $3X_1 + 6X_2 \leq 24$
 $6X_1 + 12X_2 \leq 18$
 $2X_1 + 8X_2 \leq 20$
 $X_1, X_2 \geq 0$ and integers

- (b) Explain the difference between Integer programming problem and Linear programming problem. 07

OR

- Q.5 (a) What are the applications areas of dynamic programming? 07

- (b) What are the types of simulation? Explain in details. 07
