Seat No.: _____ *Enrolment No._____*

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**

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 and $X_3 >= 0$

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**

Maximize Z = 4X1 +10 X2 +25X3

Subject to

$X_1 + 4X_2 + 10X_3 <= 30$

$4X_1 + 10X_2 + 10X_3 <= 40$

$6X_1 + 8X_2 + X_3 <= 20$

X_1, X_2 and $X_3 >= 0$

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

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

Maximize $Z = 3X_1^2 + 10 X_1 X_2 - 8X_2^2$

Subject to

$3X_1 + 12X_2 <= 84$

X_1 and $X_2 <= 0$

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 arte 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 $3X_1 + 6X_2 <= 24$

$6X_1 + 12X_2 <= 18$

$2X1 + 8X2 <= 20$

$X_1, X_2 >= 0$ 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**

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