Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2721314 **Date: 31/05/2016**

Subject Name: Decision Models in Management

Time:10:30 am to 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: Operation Research, Optimal Solution, Unbounded Solution. **07**

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

Maximize $Z = 7x_1 + 6x_2$

Subject to, $2x_1 + 3x_2 \leq 19$,

$3x_1 + x_2 \leq 11$,

$6x_1 - 2x_2 \geq 2$,

$x_1, x_2 \geq 0$.

Q.2 **(a)** Explain: Basic variable, Slack variable, Surplus variable. **07**

(b) Solve the following LP problem by Simplex method. **07**

Maximize $Z = 10x_1 + 7x_2$

Subject to, $4x_1 + x_2 \leq 22$,

$6x_1 - 3x_2 \leq 6$,

$x_1, x_2 \geq 0$.

OR

(b) Write the dual of following primal LPP, and solve dual by Simplex method. **07**

Minimize $G = 52y_1 + 53y_2$

Subject to, $3y_1 + 2y_2 \geq 5$,

$2y_1 + 5y_2 \geq 8$,

$y_1, y_2 \geq 0$.

Q.3 **(a)** Discuss briefly the Kuhn-Tucker conditions for Non-linear optimization. **05**

(b) Solve the following problem using Kuhn Tucker conditions **09**

Minimize $Z = (X_1 - 4)^2 + (X_2 - 4)^2$

Subject to

$X_1 + X_2 \leq 4$,

$X_1 + 3X_2 \leq 9$,

X_1 and $X_2 \geq 0$

OR

Q.3 **(a)** Explain general structure of a queuing system; arrival process, service system, and queue structure. **05**

(b) A toll plaza has 4 toll booths, each of them serves on an average 1.5 vehicle/min (the service time being distributed exponentially). The arrival rate of vehicles to the toll plaza is 4 vehicles/min (follow Poisson distribution). Compute **09**

(a) The probability that all the booths would be idle

(b) The probability that there shall be 6 vehicles in the toll plaza

(c) The average number of the vehicles waiting in a queue

(d) The average number of the vehicles being serviced

(e) The average time a vehicle spends waiting for service

(f) The average time a vehicle spends in the toll plaza.

Q.4 **(a)** What is 'Transportation Problem'? Describe the North-west corner method for finding initial feasible solution of Transportation problem. **05**

(b) Solve the following transportation problem. Cell values are in Rs. Find initial feasible solution by Vogel's Approximation method and test the optimality by MODI method. **09**

From	To			Supply
	D	E	F	
A	7	5	2	70
B	4	8	6	40
C	9	4	3	50
Demand	30	90	40	

OR

Q.4 **(a)** Describe briefly 'Simulation' and its applications. **07**

(b) Solve the following assignment problem for minimum cost using Hungarian Assignment Method **07**

	A	B	C	D
1	54	41	52	64
2	65	53	63	55
3	48	61	46	67
4	44	59	61	58

Q.5 **(a)** Describe briefly 'Minimum spanning tree problem'. **07**

(b) Define 'Dynamic programming problem'. State its application areas. **07**

OR

Q.5 **(a)** Write any one algorithm to solve Shortest Path problem. **07**

(b) Explain Integer programming problem with example. **07**

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