Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–II EXAMINATION – SUMMER 2015

Subject Code: 2721314 **Date: 01/06/2015**

Subject Name: Decision Models in Management

Time: 02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

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

Q.1 **(a)** Define: Infeasible solution, Unbounded solution, Degeneracy, Basic variable, Slack variable. **07**

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

Maximize $Z = 10x_1 + 6x_2$

Subject to, $x_1 + 2x_2$ Ò8,

$3x_1 + x_2$ Ò9,

$4x_1$ ï x_2 Ó5,

x_1, x_2 Ó0.

Q.2 **(a)** Solve the following LP problem by Simplex method. **07**

Maximize $Z = 5x_1 + 6x_2$

Subject to, $2x_1 + 5x_2$ Ò26,

$8x_1 - 4x_2$ Ò8,

$3x_1$ ï x_2 Ò5,

x_1, x_2 Ó0.

(b) One unit of product A contributes Rs. 7/- and requires 3 units of raw material and 2 hours of labour. One unit of product B contributes Rs. 5/- and requires 1 unit of raw material and 1 hour of labour. Availability of the raw material at present is 48 units and there are 40 hours of labour. **07**

(a) Formulate it as a LP problem; (b) Write its dual.

OR

(b) Explain the procedure of converting LP problem from primal to dual. What are the advantages of solving dual? **07**

Q.3 **(a)** Explain general structure of a queuing system; arrival process, service system, and queue structure. **07**

(b) Customers for a local bakery arrive randomly following Poisson process. The single sales man can attend customers at an average rate of 12 customer/hr, the service time being distributed exponentially. The mean arrival rate of the customers is 10/hr. Determine the following **07**

(a) the mean number of customers in the bakery

(b) the mean time spent by a customer in the bakery

(c) the expected number of customers waiting to be served

(d) the mean waiting time of a typical customer in the queue

OR

Q.3 **(a)** Discuss: FIFO, SIRO, Jockeying, Reneging, Balking. **07**

(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 5 vehicle/min (follow Poisson distribution). Compute **07**

(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? Discuss the methods of finding initial feasible solution of a transportation problem and state their advantages and disadvantages. **07**

(b) Solve the following transportation problem. Cell values are in Rs. Find initial feasible solution by North West Corner method and test the optimality by MODI method. **07**

From	To				Supply
	1	2	3	4	
1	8	8	5	12	70
2	6	9	11	9	70
3	10	15	6	13	100
4	6	8	7	8	60
Demand	60	80	70	90	

OR

Q.4 **(a)** What is an assignment problem? Explain the Hungarian Assignment method. **07**

(b) Solve the following assignment problem for minimum cost. **07**

	A	B	C	D
1	16	13	17	19
2	12	14	13	16
3	14	11	12	17
4	15	10	14	13

Q.5 **(a)** Define simulation and its advantages. Discuss various application areas of simulation. **07**

(b) What is the shortest path problem? Write any one algorithm to solve this. **07**

OR

Q.5 **(a)** Define the dynamic programming problem. Explain the application areas of dynamic programming. **07**

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

Maximize $Z = 8x_1 + 6x_2$

Subject to, $2x_1 + 4x_2$ Ò11,

$4x_1 - 2x_2$ Ò7,

x_1, x_2 Ó0 and integers.

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