

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME - SEMESTER– II(New course) • EXAMINATION (Remedial) – WINTER- 2015**

**Subject Code: 2721314****Date: 11/12/2015****Subject Name: Decision Models in Management****Time: 2:30 pm to 5:00 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) Differentiate between  $\leq$  slack,  $\geq$  surplus, and artificial variables. How do they differ by their structure and use? **07**
- (b) Describe with sketches following conditions for LPP graphics: (i) Infeasibility, (ii) Multiple optimal solution. **07**
- Q.2** (a) Define: Unbounded solution, Basic variable, Degeneracy, Shadow prices. **07**
- (b) Solve the following LP problem graphically. **07**
- Maximize  $Z = 9x_1 + 5x_2$   
 Subject to,  $x_1 + 2x_2 \leq 10$ ,  
 $3x_1 + x_2 \leq 15$ ,  
 $4x_1 - x_2 \leq 13$ ,  
 $x_1, x_2 \geq 0$ .
- OR**
- (b) Solve the following LP problem graphically. **07**
- Maximize  $Z = 28x_1 + 30x_2$   
 Subject to,  $6x_1 + 3x_2 \leq 18$ ,  
 $3x_1 + x_2 \leq 8$ ,  
 $4x_1 + 5x_2 \leq 30$ ,  
 $x_1, x_2 \geq 0$ .
- Q.3** (a) Solve the following LP problem by Simplex method. **09**
- Maximize  $Z = 6x_1 + 7x_2$   
 Subject to,  $2x_1 + 5x_2 \leq 12$ ,  
 $8x_1 - 3x_2 \leq 2$ ,  
 $3x_1 - x_2 \leq 1$ ,  
 $x_1, x_2 \geq 0$ .
- (b) Explain with sketch general structure of a Queuing System. **05**
- OR**
- Q.3** (a) Write the dual of following primal LPP and solve dual by Simplex method. **09**
- Maximize  $Z = 40x_1 + 35x_2$   
 Subject to,  $2x_1 + 3x_2 \leq 60$ ,  
 $4x_1 + 3x_2 \leq 96$ ,  
 $x_1, x_2 \geq 0$ .
- (b) Explain with sketch different types of a Queuing Service System. **05**
- Q.4** (a) What is Transportation problem? Give its mathematical model. **05**

- (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. **09**

From	To			Supply
	D	E	F	
A	6	4	1	50
B	3	8	7	40
C	4	4	2	60
Demand	20	95	35	

**OR**

- Q.4** (a) What is an Assignment problem? How can you formulate it as a standard LPP? **07**  
 (b) Solve the following assignment problem for minimum cost using Hungarian Assignment Method **07**

	A	B	C	D
1	45	40	51	67
2	57	42	63	55
3	49	52	48	64
4	41	45	60	55

- Q.5** (a) What is Simulation? Describe its applications. **05**  
 (b) A departmental store has a single cashier. During the rush hours, customers arrive at the rate of 20 customers/hr. The average no. of customers that can be processed by the cashier is 24/hr. Assume that the conditions for use of the single channel queuing model apply. What is the **09**  
 (i) probability that the cashier is idle?  
 (ii) average no. of customers in the queuing system?  
 (iii) average time a customer spends in the system?  
 (iv) average no. of customers in the queue?  
 (v) average time a customer spends in the queue waiting for service?

**OR**

- Q.5** (a) What is the shortest path problem? Write any one algorithm to solve this. **06**  
 (b) Briefly discuss: (i) Integer programming, (ii) Dynamic programming. **08**

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