

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE – 7 SEMESTER (Old) – EXAMINATION – SUMMER 2018**

**Subject Code:172503****Date:03/05/2018****Subject Name: Optimization Methods****Time: 02:30 pm to 05:00 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 the process of developing OR Model **07**  
 (b) What is graphical method of solving Linear Programming problem? Explain with suitable example **07**
- Q.2** (a) Solve following problem with simplex method **07**  
 Max  $Z=10x+15y+20z$   
 Subject to  $2x+4y+6z \leq 24$   
 $3x+9y+6z \leq 30$   
 $x,y,z \geq 0$
- (b) Explain duality in linear programming problem with suitable example **07**
- OR**
- (b) A small manufacturer employs five skilled men and ten semi-skilled men for making a product in two qualities: a deluxe model and an ordinary model. The production of a deluxe model requires 2-hours work by a skilled man and a 2-hour work by a semi-skilled man. The ordinary model requires 1-hour work by a skilled man and a 3-hours work by a semi-skilled man. According to worker union's rules, no man can work more than 8-hours per day. The profit of the deluxe model is Rs.1000 per unit and that of the ordinary model is Rs.800 per unit. Formulate a linear programming model for this manufacturing situation to determine the production volume of each model such that the total profit is maximized. **07**
- Q.3** (a) Solve following problem with **Big M** Method **07**  
 Minimize  $Z=20x_1+10x_2$   
 Subject to  $x_1+2x_2 \leq 40$   
 $3x_1+x_2=30$   
 $4x_1+3x_2 \geq 60$   
 $x_1, x_2 \geq 0$
- (b) Construct the dual of the problem: **07**  
 Maximize  $Z = 3x+5y$   
 Subject to  $x-2y \geq 3$   
 $x+3y \geq 9$   
 $x-y \leq 5$   
 $x,y \geq 0$

**OR**

- Q.3 (a)** Find the initial basic feasible solution of the following transportation problem by Vogel's approximation method: **07**

	Warehouses				Capacity
	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	
F <sub>1</sub>	10	30	50	10	7
F <sub>2</sub>	70	30	40	60	9
F <sub>3</sub>	40	8	70	20	18
Requirement	5	8	7	14	34

- (b)** Describe Transshipment problem with suitable example **07**

- Q.4 (a)** Solve the following assignment problem using Hungarian method. The matrix entries are processing times 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

- (b)** Explain travelling sales-man problem with suitable example **07**

**OR**

- Q.4 (a)** There is congestion on the platform of Ahmedabad Railway station. The trains arrive at the rate of 30 trains per day. The waiting time for any train to flag-off is exponentially distributed with an average of 36 minutes. Calculate the following: **07**

- i) The mean queue size.
- ii) The probability that the queue size exceeds 10.

- (b)** Explain M/M/1 model of queuing in detail with suitable example **07**

- Q.5 (a)** Solve following game problem **07**

Player A	Player B			
	1	2	3	4
1	6	2	4	8
2	2	-1	1	12
3	2	3	3	9
4	5	2	6	10

- (b)** Explain method of Linear Programming to solve game problem with suitable example **07**

**OR**

- Q.5 (a)** Explain Inventory model of simulation with suitable example **07**

- (b)** Describe advantages and dis-advantages of simulation in detail **07**

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