Seat No.: _____ Enrolment No._____

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 $2x+4y+6z \le 24$

$3x+9y+6z \le 30$

$x,y,z \ge 0$

(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 $x_1+2x_2 \le 40$

$3x_1+x_2=30$

$4x_1+3x_2 \ge 60$

$x_1, x_2 \ge 0$

(b) Construct the dual of the problem: **07**

Maximize $Z = 3x+5y$

Subject to $x- 2y \ge 3$

$x + 3y \ge 9$

$x – y \le 5$

$x,y \ge 0$

OR

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

	Warehouses				
	W_1	W_2	W_3	W_4	Capacity
F_1	10	30	50	10	7
F_2	70	30	40	60	9
F_3	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 Hungerian 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 B			
		1	2	3	4
Player A	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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