Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 172503 **Date: 23/11/2016**

Subject Name: Optimization Methods

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)** Describe properties of Duality in detail with suitable example **07**

(b) Use Big M method to solve the following **07**

Minimize $Z = 2X_1 + 3X_2$

Subject to…

$3X_1 + 4X_2 \geq 5$

$4X_1 + 5X_2 \geq 7$

$X_1 + 2X_2 \leq 4$

$X_1, X_2 \geq 0$

Q.2 **(a)** Explain the following terms. **07**

- Basic Feasible Solution.
- Degenerate Basic Feasible Solution.
- Optimal Solution.
- Feasible Solution

(b) Two products A & B are to be manufactured. One single unit of A requires 2.4 minutes of punch press time & 5 minutes of assembly time. The profit for product A is Rs. 0.60 per unit. One single unit of B requires 3 minutes of punch press time & 2.5 minutes of welding time. The profit for product B is Rs. 0.70 per unit. The capacity of the punch press dept. available for these products is 1200 mins/week. The welding dept. has an ideal capacity of 600 mins/week & assembly dept. has 1500 mins/week. Formulate the problem as LPP. Determine the quantities of products A & B so that the total profit is maximized. **07**

OR

(b) Explain following term with neat sketch on graph **07**

1. Unbounded region 2. Infeasible region 3. Feasible region

Q.3 **(a)** Explain the scope of Operation Research. **07**

(b) Determine the value of game and optimal strategy for player A and B **07**

		Player B's Strategy			
		B1	B2	B3	B4
Player A's Strategy	A1	-1	2	-1	10
	A2	1	-2	5	-2
	A3	-5	2	-5	10
	A4	1	-10	5	-10

OR

Q.3 **(a)** What do you understand by Queue Discipline, Arrival Process and Service Process. **07**

(b) A company produces two types of leather belts. Belt type A is if superior quality and type B is of lower quality. Profits on the two types of belts are Rs. 40/- and Rs. 30/- respectively. Each belt of type A requires twice as much time as required by belt B. If all belts were of type B the company can produce 1000 **07**

belts per day. But the supply of leather is sufficient only for 800 belts per day. Belt of type A requires a fancy buckle and only 400 fancy buckles are available for this per day. For belt of type B only 700 buckles are available per day. How should the company manufacture two types of belts in order to have overall maximum profit? Formulate the problem as LPP and solve it graphically.

Q.4 **(a)** With figure explain various arrangements of service facilities in queuing system. **07**

(b) Explain algebraic method in detail to solve the game problem having no saddle point with suitable example. **07**

OR

Q.4 **(a)** Explain various methods of transportation problem solution with suitable example **07**

(b) Solve following transportation problem **07**

From\To	A	B	C	D	SUPPLY
1	11	20	7	8	50
2	21	16	20	12	40
3	8	12	8	9	70
DEMAND	30	25	35	40	

Q.5 **(a)** A company has a team of four salesmen and there are four districts where the company wants to start its business. After taking into account the capabilities of salesman and the nature of districts, the company estimates that the profit per day in rupees for each salesman in each district is as below: **07**

Districts

		1	**2**	**3**	**4**
Salesman	**A**	16	10	14	11
	B	14	11	15	15
	C	15	15	13	12
	D	13	12	14	15

(b) Write a short note on Monte Carlo Simulation. **07**

OR

Q.5 **(a)** *"Assignment problems are special cases of transportation problems."* – Justify the statement. **07**

(b) What are the Applications of Simulation **07**

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