Roll No. Total No. of Pages : 03

Total No. of Questions : 08

M.Tech.(ME) (Sem.–1)

OPTIMIZATION TECHNIQUES

Subject Code : MME-501

Paper ID : [E0408]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

Q1. a. Why do some problems have multiple optimal feasible solution? How such information is useful for decision making? Explain. (10)

b. Explain the following concept in the context of liners programming : (10)

i) Convex polygon.

ii) Redundant constraints.

Q2. Use two- phase simplex method to maximize : (20)

$$Z= 3x_1+2x_2+2x_3$$

Subjected to : $5x_1+7x_2+4x_3 \le 7$

$$-4x_1+7x_2+5x_3 \ge -2$$

$$3x_1+4x_2-6x_3 \ge 29/7$$

$$x_1, x_2, x_3 \ge 0$$

Q3. Find the optimal cost of the following transportation matrix : (20)

	D1	D2	D3	D4	Supply
O1	12	18	13	20	50
O2	17	11	16	15	60
O3	11	10	14	13	40
Demand	20	25	10	35	

Q4. Consider the problem of assigning five operators to five machines. The assignment costs are given below : (20)

Operators

		I	II	III	IV	V
	A	10	5	13	15	16
	B	3	9	18	3	6
Machines	C	10	7	2	2	2
	D	5	11	9	7	12
	E	7	9	10	4	12

Assign the operator to different machines, so that total cost is minimized.

Q5. A project schedule has the following characteristics : (20)

Activity	Time (weeks)	Activity	Time (weeks)
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-10	5
4-9	3	9-10	7

a. Construct the network.

b. Compare E and L for each event.

c. Find the critical path.

Q6. For any 2*2 two person zero-sum game without any saddle point, having payoff matrix for player A as : (20)

	Player B		
Player A		B1	B2
	A1	a11	a12
	A2	a21	a22

Find the optimal mixed strategies and value of the game.

Q7. Consider the following N.L.P.P, Minimize Z= $2x_1^2-24x_1+2x_2^2-8x_2+2x_3^2-12x_3+200$ by separating this function into three one variable functions, show that the function is convex. Solve the problem by showing each one variable by calculus. (20)

Q8. Employing graphical method, minimize the distance of the origin from the concave region bounded by the constraint :

$x_1+x_2 \geq 4$

$2x_1+x_2 \geq 5$

$x_1, x_2 \geq 0$

Verify that the Kuhm-Tucker necessary conditions hold at the point of minimum distance. (20)