Roll No. | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 08

Ph.D. in Faculty of Applied Science (ME) /

Ph.D. in Faculty of Engineering (CSE)

OPTIMIZATION TECHNIQUES

M.Code : 77382

Time : 3 Hrs. **Max. Marks : 100**

INSTRUCTIONS TO CANDIDATES :

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

1. a) Explain the concept scope and methodology of operation research as applicable to business and Industry.

   b) Write short note on 'Sensitivity analysis in linear programming problems'.

2. Use Two Phase method to solve the following LPP :

   Maximize $z = 3x_1 - x_2 + 2x_3$

   Subject to : $x_1 + 3x_2 + x_3 \leq 5$

   $2x_1 - x_2 + x_3 \geq 2$

   $4x_1 + 3x_2 - 2x_3 = 5$ where $x_1, x_2, x_3 \geq 0$

3. Use the dual simplex method to solve the following LP :

   Maximize $z = -2x_1 - x_3$

   Subject to : $x_1 + x_2 - x_3 \geq 5$

   $x_1 - 2x_2 + 4x_3 \geq 8$ where $x_1, x_2, x_3 \geq 0$

4. Given below is a table taken from the solution process of a transportation problem :

		Distribution Centres			
		2	**3**	**4**	***Availability***
Factories	**A**	10	8 (5,000)	7	12	5,000
	B	12	13	6 (4,500)	10 (1,500)	6,000
	C	8 (7,000)	10 (500)	12	14 (1,500)	9,000
Demand		**7,000**	**5,500**	**4,500**	**3,000**	

a) Is the solution feasible?

b) Is the solution degenerate?

c) Is the solution optimal? If not, find the optimal solution.

d) Is there alternate optimal solution? If yes, find that solution.

5. Clipper Ocean Liners gets license to ferry 7 days a week between Kandla and the island of Diu, as per the schedule given on right. Obtain the pairing of sails to minimize layover time of the crew away from home, subject to the condition of minimum 5 hours of rest. For any given pairing, the crew will be based at the place that results in smaller layover. Also obtain the resulting minimum layover time, mentioning the place where the crew for a particular ferry-pairing should be based.

Kandla – Diu			Diu – Kandla		
Ferry	Dep.	Arr.	Ferry	Dep.	Arr.
U1	6 am	8 am	D1	8 am	10 am
U2	8 am	10 am	D2	9 am	11 am
U3	2 pm	4 pm	D3	3 pm	5 pm
U4	8 pm	10 pm	D4	7pm	9 pm

6. Using dynamic programming to find the value of :

Max. $Z = 10x_1 + 30x_2$

Subject to : $3x_1 + 6x_2 \leq 168$

$12x_2 \leq 240$ where $x_1, x_2 \geq 0$

7. Solve the following linear programming problem using Gomory Integer Programming method :

Maximize $\underline{Z} = 5x_1 + 7x_2$

Subject to : $-2x_1 + 3x_2 \leq 6$

$6x_1 + x_2 \leq 30$ where $x_1, x_2 \geq 0$ and integers

8. a) Discuss briefly the various phases of solving an OR problem.

b) What are the characteristics of Dynamic Programming? Give its various applications.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.