Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 08

M.Tech.(ME) PT (Sem.–1)

OPTIMIZATION TECHNIQUES

Subject Code : MME-501

M.Code : 38202

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

INSTRUCTIONS TO CANDIDATES :

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

1. a) What are slack and surplus variables ? 5

   b) A Manufacturer produces two types of models M1 and M2. Each model of the type M1 requires 4 hours of grinding and 2 hours of polishing, whereas each model of the type M2 requires 2 hours of grinding and 5 hours of polishing. The manufacturer has 2 grinders and 3 polishers. Each grinder works 40 hours a week and each polisher works for 60 hours a week. Profit on M1 model is Rs. 3.00 and on model M2 is Rs. 4.00. Whatever is produced in a week is sold in the market. How should the manufacturer allocate his production capacity to the two types of models, so that he may make the maximum profit in a week? Write a suitable LPP for the above question. 15

2. Use simplex method to solve the following LP problem. 20

   Maximum $Z = x_1 + x_2 + 3x_3$

   Subject to $3x_1 + 2x_2 + x_3 \leq 3$

   $2x_1 + x_2 + 2x_3 \leq 2$

   $x_1, x_2 \geq 0$

3. a) What are the common errors in construction of a network ? 5

   b) Calculate the earliest start, earliest finish, latest start and latest finish of each activity of the project given below : 15

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration Weeks)	8	7	12	4	10	5	5	10	7	4

4. Solve using Vogel's Approximation Method and perform optimality Test using MODI method : 20

	D1	D2	D3	D4	Supply
O1	2	3	11	7	6
O2	1	0	6	1	1
O3	5	8	15	9	10
Demand	7	5	3	2	17

5. A game has the payoff matrix $A = \begin{bmatrix} 0 & 1 \\ 2 & 1 \end{bmatrix}$. Show that E $(x, y) = 1 - 2y\,(x - 1/2)$ and deduce that in the solution of the game, the second player follows a pure strategy while the first has infinite number of mixed strategies. 20

6. Consider the problem of assigning five operators to five machines. The assignment costs are given in figure. 20

	M1	M2	M3	M4	M5
A	7	7	-	4	8
B	9	6	4	5	6
C	11	5	7	-	5
D	9	4	8	9	4
E	8	7	9	11	11

7. Use dynamic programming to Max $Z = 2x_1 + 3x_2$ subject to constraint : 20

$x_1 + x_2 \leq 1$

$x_1 + x_2 \leq 3$

$x_1 + x_2 \geq 0$

and $x_1, x_2, x_3 \geq 0$

8. Find the minimum of $f = x\,(x + 48/x^2)$ using variable bound method with initial guess of 0.6 and increment 0.5. 20

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.