

Code: MEMD2T1

I M.Tech - II Semester - Regular Examinations – AUGUST 2016

**ADVANCED OPTIMIZATION TECHNIQUES
(MACHINE DESIGN)**

Duration: 3 hours

Max. Marks: 70

Answer any FIVE questions. All questions carry equal marks

1)

a) Write the algorithm of simplex method. 4 M

b) Using Big M method: 10 M

Maximize $z = 5x_1 - x_2 - 7x_3$

Subject to constraints $x_1 + 2x_2 - 3x_3 \geq 15$

$$5x_1 - 6x_2 + 10x_3 \geq 0$$

$$x_1 + x_2 + x_3 = 5$$

$$x_1 - 2x_2 \leq 1$$

and $x_1, x_2, x_3 \geq 0$

2)

a) Explain Hungarian's algorithm. 6 M

b) A company has four machines on which to do 3 jobs, each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following table:

8 M

Job	Machine			
	A	B	C	D
1	18	24	28	32
2	8	13	17	19
3	10	15	19	22

Determine the optimum assignment.

- 3)
- a) Explain the one dimensional optimization search method. 7 M
- b) State and prove Kuhn-Tucker conditions. 7 M
- 4) Explain an exterior penalty function method to solve a constrained non-linear programming problem. 14 M
- 5)
- a) What are the advantages of G.A. when compared to conventional algorithms? 7 M
- b) Explain crossover and mutation. Why are they required in G.A.? 7 M
- 6) Explain with regard to G.P.: 14 M
- a) terminal sets, b) functional sets and
- c) random population generation.

7. Maximize $z = u_1^2 + u_2^2 + u_3^2$
Subject to $u_1 + u_2 + u_3 = 10$
and $u_1, u_2, u_3 \geq 0$

Use dynamic programming. 14 M

8. Explain the formulation of the following problem:

14 M

- a) General optimization model of a machining process.
- b) Optimization of arc welding parameters.