PVP 17

Code: **17MEMD2T2**

I M.Tech - II Semester – Regular/Supplementary Examinations
July 2019

ADVANCED OPTIMIZATION TECHNIQUES
(MACHINE DESIGN)

Duration: 3 hours Max Marks: 60

Answer the following questions.

1. Solve the following LP problem: 15 M

Minimize $f = -45\ x_1 - 100\ x_2 - 30\ x_3 - 50\ x_4$

Subject to

$$7x_1 + 10\ x_2 + 4x_3 + 9x_4 \leq 1200$$

$$3x_1 + 40\ x_2 + x_3 + x_4 \leq 800$$

$$x_i \geq 0$$

Investigate the change in the optimum solution of the problem when the following change is made by using sensitivity analysis: C_3 from -30 to -24

(OR)

2. a) Discuss the types of multi stage decision problems with neat diagrams. 7 M

b) Maximize $f = 4x_1 + 2x_2$

Subject to

$$x_1 - 2x_2 \geq 2$$

$$x_1 + 2x_2 = 8$$

$$x_1 - x_2 \leq 11$$

$$x_i \geq 0$$

Write dual of this problem. 8 M

3. Perform two iterations of Newton's method to minimize the following function from the stated starting point.

$f(x_1, x_2) = 100\ (x_2 - x_1)^2 + (1 - x_1)^2$ from the starting point (-1.2 1.0). 15 M

(OR)

4. Consider the following problem:

Minimize $f(x) = x_1^2 + x_2^2 + x_3^2$

Subject to

$$x_1 + x_2 + x_3 \geq 5$$

$$2 - x_2 x_3 \leq 0$$

$$x_1 \geq 0, x_2 \geq 0, x_3 \geq 2$$

Determine whether the Kuhn-Tucker conditions are satisfied at the following points:

X_1=[1.5 1.5 2] X_2= [2 1 2] 15 M

5. Describe the computational procedure of genetic algorithm for optimization of a function. 15 M

(OR)

6. a) Discuss the differences between genetic algorithm and genetic programming. 7 M

   b) Illustrate the principle of genetic programming. 8 M

7. Solve the following problem using Gomory's cutting plane method:

$$Maximize\ f = 6x_1 + 7x_2$$

Subject to

$$7x_1 + 6x_2 \leq 42$$

$$5x_1 + 9x_2 \leq 45$$

$$x_1 - x_2 \leq 4$$

$$x_i \geq 0\ and\ integer, i = 1,2$$

15 M

(OR)

8. Discuss the general procedure in optimizing machining operations sequence. 15 M