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GIET UNIVERSITY, GUNUPUR – 765022
M. Tech (Second Semester Examinations) – October' 2021
MPEMD 2043 – OPTIMIZATION TECHNIQUES IN DESIGN
(Machine Design)

Time: 2 hrs

Maximum: 50 Marks

(The figures in the right hand margin indicate marks)

PART – AQ.1. Answer **ALL** questions

(2 x 10 = 20)

- What are slack and surplus variables?
- What are the components of LPP?
- What is the difference between feasible solution and basic feasible solution?
- Explain why Fibonacci search method is called sequential search method
- What is the basic concept of Golden search method?
- Give the general form of NLPP.
- What is no passing rule in a sequencing algorithm?
- Write Beale's algorithm for QPP?
- Explain the four elements that characterize a sequencing problem.
- Where genetic algorithm is used?

PART – B**(6 x 5 = 30 Marks)**Answer **ANY FIVE** questions

Marks

- Use simplex method to solve the following LP problem (6)

$$\text{Maximize } Z = x_1 + x_2 + 3x_3$$

$$\text{Subject to } 3x_1 + 2x_2 + x_3 \leq 3$$

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

$$\text{and } x_1, x_2 \geq 0$$

- Solve the following integer programming problem using branch-bound method: (6)

$$\text{Minimize } Z = 3x_1 + 4x_2$$

$$\text{Subject to } 7x_1 + 16x_2 \leq 52$$

$$3x_1 - 2x_2 \leq 18$$

$$x_1, x_2 \geq 0 \text{ and } x_1, x_2 \text{ are integers}$$

- Using Revised Simplex method to solve the following LPP (6)

$$\text{Maximize } Z = 6x_1 - 2x_2 - 3x_3$$

$$\text{Subject to } 2x_1 - x_2 + 2x_3 \leq 2$$

$$x_1 - 3x_3 \leq 4$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

- Use Lagrange's method to *Minimize* $Z = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2$ (6)

$$\text{Subject to } x_1 + x_2 + x_3 = 15,$$

$$2x_1 - x_2 + 2x_3 = 20$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

6. Solve the following NLPP by using Kuhn-Tucker conditions (6)

$$\text{Maximize } Z = 7x_1^2 + 6x_1 + 5x_2^2$$

$$\text{Subject to } x_1 + 2x_2 \leq 10, \quad x_1 - 3x_2 \leq 9$$

$$\text{and } x_1, x_2 \geq 0.$$

7. Solve the QPP by Wolfe's method (6)

$$\text{Maximize } Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$$

$$\text{Subject to } x_1 + 2x_2 \leq 2$$

$$\text{and } x_1, x_2 \geq 0$$

8. What do you mean sequencing model? Explain the same with suitable example. (6)

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