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BIMEE-022

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

00202

December, 2017

BIMEE-022 : OPTIMIZATION FOR ENGINEERING DESIGN

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Assume any suitable data, if missing.*

1. (a) Explain how and why optimization techniques have been valuable in aiding an executive decision. 7

(b) What do you understand by deterministic and probabilistic models that are used in optimization ? Explain briefly. 7

2. (a) Differentiate between single and multi-variable optimization giving suitable example. 7

(b) Use the two-phase method to

minimize

$$z = x_1 + x_2$$

subject to

$$2x_1 + x_2 \geq 4$$

$$x_1 + 7x_2 \geq 7$$

$$x_1, x_2 \geq 0.$$ 7

3. (a) Explain the graphical method for solving a linear goal programming problem. 7

(b) Using the simplex method, solve the following problem : 7

Minimize

$$z = -40x_1 - 100x_2$$

subject to

$$10x_1 + 5x_2 \leq 250$$

$$2x_1 + 5x_2 \leq 100$$

$$2x_1 + 3x_2 \leq 90$$

$$x_1, x_2 \geq 0$$

4. (a) Explain stochastic processes with suitable examples. 7

(b) Solve the following problem using Big M method : 7

Maximize

$$z = 6x_1 - 3x_2 + 2x_3$$

subject to

$$2x_1 + x_2 + x_3 \leq 16$$

$$3x_1 + 2x_2 + x_3 \leq 18$$

$$x_1 - 2x_3 \geq 8$$

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

5. (a) Explain the concept of duality in LPP. 7

(b) Solve the following LP problem using Charles' penalty method : 7

Maximize

$$z = 3x_1 - x_2$$

subject to constraints

$$2x_1 + x_2 \geq 2$$

$$x_1 + 3x_2 \leq 3$$

$$x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

6. (a) Discuss the typical characteristics of constrained problem. Explain in brief, direct and indirect methods. 7

(b) Discuss the differences and similarities between GA and traditional method. 7

7. Write short notes on any ***two*** of the following : 7+7

(a) Geometric Programming

(b) Goal Programming

(c) Dual Linear Programming

(d) Optimization Techniques as Tools for Decision-Making
