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BIMEE-004

00104

B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2014

BIMEE-004 : OPTIMIZATION TECHNIQUES IN ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note: *Answer **any five** of the following questions. **All** questions carry **equal** marks. Assume a suitable value for any missing data. Use of scientific calculator is **permitted.***

1. Attempt **any two** parts : **7x2=14**

(a) Define Fibonacci numbers. What is the difference between Fibonacci and Golden section methods ?

(b) Discuss in brief :

(i) Exhaustive search method

(ii) Dichotomus search method

(c) Write short notes on :

(i) Regular falsi method

(ii) Internal halving method

2. What do you understand by linear programming ? **14**

Maximize : $P = 3x + 4y$

Subject to :

$x + y \leq 4$

$2x + y \leq 5$

$x \geq 0, y \geq 0$

Use simplex method to solve the problem.

3. Use the Lag range multiplier method to find the greatest and least distances from the point (2, 1, 2) to the sphere with the equation $x^2+y^2+z^2=1$ 14

4. A company has three plants which supply to four market areas. S_i, plant capacity of plant i, D_j, demand of market area j and C_{ij} the cost of shipping unit product from plant i to market j are given in the table below. Use Vogel's approximation method to find the solution. **14**

Table : Transportation cost along with plant capacities and market demand.

Plant	Market				Capacity
	1	2	3	4	
1	8	4	5	10	10
2	7	3	6	8	8
3	9	4	7	10	7
Demand	6	3	7	9	25

5. Solve by simplex method the following linear programming problem : **14**

Minimize : $Z=3x_1+4x_2+5x_3$

Subject to constraints :

$x_1+x_2+2x_3 \geq 30$

$2x_1+x_2+x_3 \geq 35$

$x_1, x_2, x_3 \geq 0$

6. Write short notes on **any two** of the following : **7x2=14**

(a) Stochastic Programming

(b) Finite Difference Method

(c) Integer Programming

(d) Optimization in Econometric Approaches

7. Answer **any two** parts : 7x2=14

(a) What is SLP method ? Why is it called cutting plane method ?

(b) Discuss the typical characteristics of constrained problem. Explain in brief direct and indirect methods.

(c) Write short notes on :

(i) Penalty Function Method

(ii) Transformation Techniques