

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

Term-End Examination

June, 2017

00274

**BIMEE-004 : OPTIMIZATION TECHNIQUES IN
ENGINEERING**

Time : 3 hours

Maximum Marks : 70

*Note : Answer any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. A company produces two products A and B, each of which requires three types of processing. The length of time for processing each unit and the profit per unit are given in the following table :

	Product A hr/unit	Product B hr/unit	Available capacity per day (hr)
Process I	130	120	8,400
Process II	30	60	3,000
Process III	80	40	4,800
Profit per unit (₹)	50	70	—

How many units of each product should the company produce per day in order to maximize the profit ? Use Simplex method.

14

2. (a) Explain the procedure of Branch and Bound method using example. 7
- (b) Distinguish between Newton and quasi-Newton methods. 7
3. Using MODI method, find the optimum solution for the following transportation problem : 14

		Dealers				
		D ₁	D ₂	D ₃	D ₄	Supply
Suppliers	S ₁	21	16	25	13	11
	S ₂	17	18	14	23	13
	S ₃	32	27	18	41	19
	Demand	7	10	12	15	-

4. (a) Describe the procedure for the solution of a non-linear programming problem by Sequential Quadratic Programming method. 7
- (b) Find the dimensions of a box of largest volume that can be inscribed in a sphere of radius 'R'. 7
5. (a) Explain the procedure for the solution of an Integer Programming Problem by Cutting-Plane method. 7

(b) Describe the methodology of Gauss-Newton method for solving an optimization problem. 7

6. (a) Find the real root of the equation $x^2 + 4 \sin x = 0$, correct to four decimal places, by using Newton-Raphson method. 7

(b) The velocity v (km/min) of a moped which starts from rest, is given at fixed intervals of time t (min) as follows :

t (min)	v (km/min)
2	10
4	18
6	25
8	29
10	32
12	20
14	11
16	5
18	2
20	0

Estimate approximately the distance covered by the moped in 20 minutes. 7

7. Write short notes on any *two* of the following : 2×7=14

- (a) Discrete Simulation
- (b) Pure and Mixed Strategy in Game Theory
- (c) Lagrange Multipliers Method