

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

Term-End Examination

00651

June, 2019

**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 manufacturer has two products I and II, both of which are made in two shops by machines A and B. The machines A and B have available time of 100 hours and 80 hours respectively. The process time per 100 for two products on two machines are :

<i>Product</i>	<i>Machine A</i>	<i>Machine B</i>
I	04 hours	05 hours
II	05 hours	02 hours

The profit on product I is ₹ 10 per 100 units and on product II is ₹ 5 per 100 units.

How much of each product is to be made to maximize the profit ?

14

2. (a) With the help of an example, explain multi-variable optimization. 7
- (b) Explain in detail about Branch and Bound approach with suitable example. 7

3. Using stepping stone method, find the optimal solution for the following transportation problem :

14

From \ To	D	E	F	Capacity
A	5	10	2	100
B	3	7	5	25
C	6	8	4	75
Requirement	80	30	90	

4. (a) Solve the game whose pay-off matrix is given below :

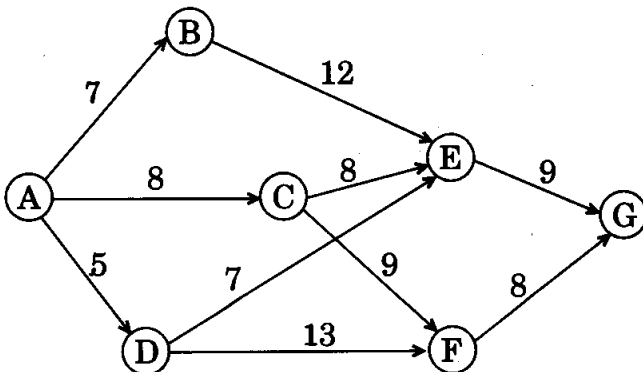
7

		Player B	
Player A	5	2	
	3	4	

Also determine the game value.

- (b) Use dynamic programming to find the shortest path from city A to city G of the following route network. (Distance between the cities are given in miles.)

7



5. (a) Use Newton-Raphson method to find out the roots of the following equation : 7

$$x^3 - 3x - 5 = 0$$

- (b) Evaluate

$$\int_0^6 \frac{1}{1+x^2} dx$$

by using Trapezoidal rule. 7

6. (a) Find the dimensions of a box of largest volume that can be inscribed in a sphere of unit radius. 7

- (b) Using a suitable example, explain the direct search method for optimizing multi-variable function with equality constraint. 7

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

- (a) Wolfe's Modified Simplex Method
 - (b) Integer Programming
 - (c) Cutting Plane Method
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