Code No: **R41028** 

IV B.Tech I Semester Supplementary Examinations, October/November - 2019 **OPTIMIZATION TECHNIQUES** 

(Mechanical Engineering)

Time: 3 hours

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Max. Marks: 75

Set No. 1

## **Answer any FIVE Questions** All Questions carry equal marks \*\*\*\*\*

- State the optimization problem. Classify and explain various types of optimization problems with examples. [15] 2 State and explain Kuhn-Tucker conditions applicable to non-linear a) programming problem. [8] Use Kuhn-Tucker conditions to solve Max  $Z = 2x_1^2 + 12x_1x_2 - 7x_2^2$  subject to b)  $2x_1+5x_2 \le 98$  and  $x_1, x_2 \ge 0$ . [7] Use simplex method to solve the following LP problem minimize 3 a) Z=5x+6y subject following constraints: to the  $2x+5y \ge 1500;$  $3x+y \ge 1200$  and x,  $y \ge 0$ . [8] Can the Simplex method find the global solution to convex set programming b) problems? [7]
- 4 Determine the optimal solution for the transportation matrix given below.

	warenouses				
	W	Х	Y	Ζ	_
Р	11	12	13	14	10
Plants Q	21	22	23	24	6 Supply
R	31	32	33	34	15
	2	9	3	17	1
Rquirements					

Warehouses

Is the solution unique? If not give alternate solution

- Find by Fibonacci method Minimum of  $f(x) = x^3 3x + 5$ ,  $0 \le x \le 1.2$  within an 5 a) interval of uncertainty  $0.35 L_0$  where  $L_0$  is the original interval of uncertainty [8]
  - What are the differences between elimination and interpolation methods? b) [7]
- 6 Using Powel's method Minimize  $f(x) = x_1 + x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$  from the starting point  $x_1 = (0,0)$ [15]

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[15]

**R10** 

## **R10**

Set No. 1

## What do you understand by the term 'penalty' in a constrained multivariable 7 a) optimization problem? [3] Consider the problem: Minimize $f(x) = x_1^2 + x_2^2 - 6x_1 - 8x_2 + 15$ b) Subject to $4x_1^2 + x_2^2 \ge 16$ $3x_1 + 5x_2 \le 15$ Normalize the constraints and find a suitable value of r<sub>1</sub> for use in the interior penalty function method at the starting point $(x_1, x_2) = (0, 0)$ . [12] Explain the typical applications of Dynamic programming in EEE. 8 [8] a) [7]

b) What are the limitations of Dynamic programming?

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