Enrolment No.\_\_\_\_\_

## **GUJARAT TECHNOLOGICAL UNIVERSITY** ME - SEMESTER-II EXAMINATION – SUMMER 2015

Subject Code: 2722912 Subject Name: Optimization Theory

## Time: 02:30 PM to 05:00 PM

## **Instructions:**

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- 4. Notations/ symbols used have usual meanings.
- Q.1 (a) Two products require three sequential processes. The following table summarizes the data of the problem.

	Minutes per unit			Unit profit
Products	Process1	processs2	process.	in INR
1	10	4	1	50
2	5	10	1.5	100
time available	2500	2000	450	
for each process				

Determine the number of product 1 and product 2 to be manufactured per week to maximize profit.

- (b) Discuss optimization technique s utility in Engineering field.
- Q.2 (a) Minimize a quadratic function  $f(x) = x^2$  ó x using ;(I) Newtonøs method and (II) 07 Quasi óNewton method.
  - (b) Using line search and QP sub problem QP (x, B), develop a typical algorithm 07 based on Successive Quadratic Programming.

## OR

- (b) Describe Successive Linear Programming. How it differs from Successive 07 Quadratic Programming?
- Q.3 (a) Solve the NLPP by using Kuhn Tucker condition  $Min z = 6x_1^2 + 5x_2^2$ Subject to constraints,

Date: 01/06/2015

Total Marks: 70

Seat No.: \_\_\_\_\_

05

09

$x_1$	$+5x_{2}$	= 3,	$x_1, x_2$	$\geq 0$
1	2	,	1' 2	

	(b)	Why penalty method is used? Discuss in detail the penalty method. OR	07
Q.3	(a) (b)	How box method is useful to find optimal solution? Minimize z, Min $z = 4x_1^2 + 5x_2^2$ ; Subject to the constraints, $2x_1 + 3x_2 - 6 = 0$ , using Lagrangian method.	07 07
Q.4	(a) (b)	Use Fibonacci search method to minimize the function $f(x) = x^2 + (54 / x)$ , in the interval [0,5]. Enlist various methods of unconstrained function values only and discuss any two of them with suitable example. <b>OR</b>	07 07
Q.4	(a)	Discuss a case study in integer programming.	07
	(b)	Enlist various region elimination methods. Discuss any one in detail.	07
Q.5	(a) (b)	Why stochastic programming is required? Explain stochastic programming with a suitable example. Discuss a case study in swarm optimization. <b>OR</b>	07 07
Q.5	<b>(a)</b>	<ul><li>How does simplex algorithm indicate that:</li><li>(i) There is an alternate optimal solution?</li><li>(ii) The problem has no feasible solution?</li><li>(iii) The problem has unbounded optimal solution?</li></ul>	07
	(b)	Discuss optimization of fuzzy system.	07

\*\*\*\*\*