Reg.	No.



## VI SEMESTER B.TECH. (AERONAUTICAL ENGINEERING)

## **MAKEUP EXAMINATIONS, JUNE 2017**

# SUBJECT: OPTIMISATION TECHNIQUES-ELECTIVE IV [AAE 4011] REVISED CREDIT SYSTEM

### (22/06/2017)

Time: 3 Hours

MAX. MARKS: 50

#### Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.

1A.	What are the differences between bracketing methods and interval reduction method?	(02)
1B.	Find and classify the stationary points of the function $2x_1^3 + 4x_1x_2^2 - 10x_1x_2 + x_2^2$ .	(03)
1C.	With a flow diagram explain the procedure for simulated annealing	(05)
2A.	What is an inflection point and how do you identify it?	(02)
2B.	Describe the stages for obtaining the better pool of population in genetic algorithm method.	(03)
2C.	Find minimum of the function 8 <i>x-x</i> <sup>4</sup> in the interval [-2, 1] using Fibonacci method.	(05)
3A.	Suppose a point satisfies sufficiency conditions for a local minima. How do you establish that, it is a global minima? Explain.	(02)
3B.	Design a can closed at one end using the smallest area of sheet metal for a specified interior volume of 600cm <sup>3</sup> . The can is a right circular cylinder with height h and radius r. The ratio of height to radius must not be less than 1.0 and not greater than 1.5. The height cannot be more than 20cm. Formulate the design optimization problem.	(03)
3C.	Find minimum of the function $f=(x-1)(x-2)(x-3)$ by secant method in the range (1.2, 2.8)	(05)
4A.	Compare the direct search methods and gradient based methods.	(02)

- **4B.** Find the direction orthogonal to the vector  $s_1 = \left[\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right]^T$  at point (03)  $x = (0,0,0)^T$
- **4C** Locate the minimum of the function  $f(x) = (x_1^2 + x_2 11)^2 + (x_1 + x_2^2 7)^2$  using simplex search method. Take the initial points are [5, 5]<sup>T</sup>, [5,-5]<sup>T</sup> and [0,0]<sup>T</sup>. Compute two iterations only.
- 5A.  $f(x) = (x_1 3)^2 + (x_2 + 4)^2 + e^{5x_3}$  (05) Given the problem Subject to  $x_1 + x_2 + x_3 \le 1$  $x_1, x_2, x_3 \ge 0$

Write the Kuhn-Tucker conditions for this problem

**5B.** Solve the problem, min  $x_1 + x_2$  subject to  $x_1^2 + x_2^2 = 1$  by Lagrange multiplier (05) method