

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

### END SEMESTER EXAMINATIONS, APR/MAY 2017

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

### REVISED CREDIT SYSTEM (29/04/2017)

Time: 3 Hours

MAX. MARKS: 50

#### Instructions to Candidates:

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

Describe genetic operators.	(03)
Carryout six iterations of single variable search to minimize the function $f(x) = 3x^2 + \frac{12}{x^3} - 5$ on the interval $\frac{1}{2} \le x \le \frac{5}{2}$ , using golden section method.	(05)
State whether the following statement is true or false giving suitable reason. "cutting plane method is an approximate method of finding an optimal solution to the constrained optimisation problem"	(02)
With a flow diagram explain the procedure for simulated annealing.	(03)
With the help of a 2-member truss, describe how the design problems can be addressed in optimization. Clearly mention the variables, objective function and the constraints.	(05)
What are the differences between Newton's method and secant method for single variable optimization?	(02)
A company can advertise the product by using local radio and T.V. stations. Its budget limits the advertisement expenditure to Rs. 100,000 per month. Each minute of radio advertisement costs Rs. 5000 and each minute of T.V. advertisement costs Rs. 10,000. The company would like to use the radio atleast twice as much as the T.V. Past experience shows that each minute of	(03)
	Carryout six iterations of single variable search to minimize the function $f(x) = 3x^2 + \frac{12}{x^3} - 5$ on the interval $\frac{1}{2} \le x \le \frac{5}{2}$ , using golden section method. State whether the following statement is true or false giving suitable reason. "cutting plane method is an approximate method of finding an optimal solution to the constrained optimisation problem" With a flow diagram explain the procedure for simulated annealing. With the help of a 2-member truss, describe how the design problems can be addressed in optimization. Clearly mention the variables, objective function and the constraints. What are the differences between Newton's method and secant method for single variable optimization? A company can advertise the product by using local radio and T.V. stations. Its budget limits the advertisement costs Rs. 5000 and each minute of T.V. advertisement costs Rs. 10,000. The company would like to use the radio atleast twice as much as the T.V. Past experience shows that each minute of

minute of radio advertisement. Formulate the optimum allocation of the monthly budget to radio and T.V. advertisements.

- **3C.** Find minimum of the function  $f(x) = (x^2 1)(x^2 2)$  using newton method with  $x^0 = (0)$  (05)
- **4A.** Explain the relationship of Marquardt's method to the Cauchy and Newton **(02)** methods. Of the three which is preferred?
- **4B.** Find weather the direction  $s=[1, 1]^T$  at point  $x=(2, 3)^T$  is descent to the function (03)  $f(x_1, x_2) = 2x_1^2 + x_2^2 2x_1x_2 + 4$
- 4C Compute two iterations of simplex search method for the function (05) *minimize*  $f(x) = (1 - x_1)^2 + (2 - x_2)^2$ ,  $x^{(0)} = [0, 0]^T$ ,  $x^{(1)} = [2, 0.5]^T$  and  $x^{(2)} = [0.5, 2]^T$

**5A.** Minimize 
$$(x-2)^2 + 2(y-1)^2$$
 (04)

Subject to  $x + 4y \le 3$   $x \ge y$  Apply Kuhn Tucker conditions.

- **5B.** Find the shortest distance from the point (1, 0) to the parabola  $y^2=4x$  by **(04)** Lagrange multiplier method.
- 5C Describe the strategies used in Tabu search method. (02)