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### Elective-III : Optimization Techniques

P. Pages : 2

Time : Three Hours



**NRJ/KW/17/4750**

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Assume suitable data whenever necessary.
  9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) What is Modelling Optimization method? Explain types of modelling tasks that can be performed. 7
- b) Explain how to formulate the procedure for setting minimum & maximum bounds on each design variables. 7

**OR**

- |           |  |           |
|-----------|--|-----------|
| <b>2.</b> | a) Explain Engineering optimization problems of data fitting and regression.         | <b>7</b>  |
|           | b) Explain various steps involved in an optimal design formulation process.          | <b>7</b>  |
| <b>3.</b> | Explain 'Local optimization' in detail? Explain disadvantages of local optimization. | <b>13</b> |

**OR**

- |           |  |           |
|-----------|--|-----------|
| <b>4.</b> | Explain global optimization point in detail. Explain all methods of global optimization. | <b>13</b> |
| <b>5.</b> | a) Minimize the function<br>$f(x) = x^2 + 54/x$ using Fibonacci search method.           | <b>7</b>  |
|           | b) Explain Bounding phase method in detail.  | <b>6</b>  |

**OR**

- |           |    |   |          |
|-----------|----|---|----------|
| <b>6.</b> | a) | Write short notes on the following              | <b>8</b> |
|           | 1) | Secant Method                                   |          |
|           | 2) | Cubic Search Method.                            |          |
|           | b) | Explain Golden section search method in detail. | <b>5</b> |

7. a) What are the optimum criteria of multivariable optimization Algorithm. 7  
b) Explain Simplex search method in detail. 6

OR

8. a) Explain Steepest decent method in detail. 6  
b) Explain Bon's evolutionary optimization method. 7
9. a) Explain Kuhn - Tucker conditions of constrained optimization Algorithm. 6  
b) Write short notes on : 7  
1) Variable elimination method  
2) Complex Search method

OR

10. a) Explain Sensitivity Analysis in detail. 7  
b) Explain transformation method in detail. 6
11. a) Solve the following 8  
Maximize  $f(x) = 2x_1 + 3x_2$   
Subject to  $x_1 \leq 6$   
 $x_1 + 2x_2 \leq 10$   
 $x_1, x_2 \geq 0$   
using simplex method.  
b) Explain sensitivity analysis of linear programming. 6

OR

12. a) Explain Duality theory in linear programming. 7  
b) Explain Big - M method in detail. 7

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**It's hard to beat a person who never gives up.**

**~ Babe Ruth**

