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IT'S HARD TO BEAT A PERSON WHO NEVER GIVES UP.

Babe Ruth, American professional baseball player

B.E. Eighth Semester (Computer Science & Engineering) (C.B.S.)
Elective - III : Optimization Techniques

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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 are Engineering optimization problem? Explain various steps involved in an optimal design formulation process. **7**

b) Explain the types of constraints that are associated with the optimization problem. **6**

OR

2. a) Explain classification of optimization Algorithm. **7**

b) Explain optimal design of a Car suspension. **6**

3. What is global optimization? Explain in detail with examples list & its advantages. **13**

OR

4. Explain local optimization in detail? Explain the disadvantages of local optimization. **13**

5. a) Explain the following Gradient based methods : **6**

   i) Newton Raphson Method

   ii) Bisection Method

b) Explain point estimation method algorithm in detail. **7**

OR

6. a) Explain Golden Section search method. **6**

b) Explain an algorithm for cubic search method. **7**

7. a) Explain Powell's conjugate direction method in detail. **7**

b) What are the optimum criteria of multivariable optimization algorithm. **7**

OR

8. a) Consider 4 variable minimization problem **8**

$$f(x_1, x_2, x_3, x_4) = (x_1 + 2x_2 - 1)^2 + 5(x_3 - x_4) + (x_2 - 3x_3)^4 + 10(x_1 - x_4)^4$$

Perform 2 iteration of following algorithm from point

$$x^{10} = (2, -1, 0, 1)^T \text{ using Hooke - Jeeves Method with } (1,1,1,1)^T.$$

b) Explain Box's evolutionary optimization method. **6**

9. a) Explain Random Search method and complex search method. **6**

b) Minimize $(x_1^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$ subject to $(x_1 - 5)^2 + x_2^2 - 26 \geq 0, \ x_1, x_2 \geq 0$ **7**
using penalty function method.

OR

10. a) Explain Lagrangian Duality theory. **7**

b) Explain sensitivity Analysis in detail. **6**

11. a) Explain Frank - Wolfe linear search method in detail. **7**

b) Explain duality in linear programming. **7**

OR

12. Explain the following. **14**

i) Artificial variables and dual phase method.

ii) Sensitivity analysis of linear programming.

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The best time to plant a tree was 20 years ago. The second best time is now.

~ Chinese Proverb