

**Roll No. ....**

**Total Pages : 03**

**MTE/D-23**

**24081**

**OPTIMIZATION TECHNIQUES**

**MT-CSE-18-31(iii)**

**(Non-CBCS)**

**Time : Three Hours]**

**[Maximum Marks : 100]**

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

- 1.** (a) What are the applications of ant colony optimization ?  
(b) What is the difference between uni-variate and multi-variate optimization problems ? Discuss.  
(c) What is a mathematical programming problem ?  
(d) What is a feasible region in linear programming ?

### **Unit I**

- 2.** (a) What do you understand by an objective function, decision variables, and constraints ? Illustrate.  
(b) Why is problem formulation important ? What are the characteristics of a good problem formulation ? Discuss.

3. (a) What is the difference between exact optimization and heuristic optimization methods ? Discuss.  
 (b) Write a detailed note on applications of optimization in engineering.

### **Unit II**

4. (a) Solve the following LPP graphically :

$$\text{Maximize : } Z = 2x + 3y,$$

Subject to :

$$x + y \leq 4,$$

$$x \geq 0,$$

$$y \geq 0.$$

- (b) Discuss the use of interior point method in semi definite programming.
5. (a) What is Optimization Problem ? Discuss the steps to find maximum and minimum values given constraints using calculus.  
 (b) What is Quadratic Programming ? Discuss the Active Set Method to solve the QP problem.

### **Unit III**

6. (a) What are the different selection techniques in Genetic Algorithm ? Discuss using suitable examples.  
 (b) What is bio-inspired optimization algorithms ? What is the background of ACO ? Discuss.

7. (a) What is the use of mutation operation in Genetic Algorithm ? How is it performed in permutation encoding ? Illustrate.  
 (b) How does particle swarm optimization work ? What is fitness value in PSO ? Illustrate.

### **Unit IV**

8. What is route optimization in networking ? Discuss the use of any optimization technique in network routing.
9. Discuss the use of any bio-inspired optimization algorithm in solving a real life problem.