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Question Paper Code	12699
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024**

Sixth Semester

**Artificial Intelligence and Data Science**

**20AIPW603 - OPTIMIZATION TECHNIQUES FOR PROGRAMMING WITH  
LABORATORY**

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

	Marks	K- Level	CO
1. State the Kuhn–Tucker conditions.	2	K1	CO1
2. What is the difference between constrained and unconstrained optimization techniques?	2	K1	CO1
3. State the General Linear Programming problem in a “matrix” form.	2	K1	CO2
4. Under what conditions are the processes of reflection, expansion, and contraction used in the simplex method?	2	K2	CO2
5. Why is a quadratically convergent method considered to be superior for the minimization of a nonlinear function?	2	K2	CO3
6. Give three reasons why the study of unconstrained minimization methods is important.	2	K1	CO3
7. What is the limitation of the linear extended penalty function?	2	K1	CO4
8. Draw the flowchart of the binary Genetic Algorithm.	2	K2	CO4
9. Describe multi-objective and single-objective optimization problems.	2	K1	CO5
10. Define Flower Pollination Algorithm.	2	K1	CO5

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) Explain the various classifications of Optimization problems in detail.	13	K2	CO1
<b>OR</b>			
b) Explain the Lagrange multiplier method to find the solution to the two-variable optimization problem with equality constraints.	13	K2	CO1
12. a) Write the Procedure for solving Linear Programming Problem using Simplex Method and Revised simplex method.	13	K3	CO2
<b>OR</b>			
b) Find the minimum of the function $f = (\lambda/\log\lambda)$ by the following methods (take the initial trial step length as 0.1): (i) Quadratic interpolation method. (ii) Direct root method.	13	K3	CO2

13. a) Explain the various direct search methods in optimization techniques. 13 K2 CO3

**OR**

b) Discuss in detail about Interior and exterior penalty function method. 13 K2 CO3

14. a) Explain in detail about Neural-Network based Optimization. 13 K2 CO4

**OR**

b) Find the minimum of  $f = x^5 - 5x^3 - 20x + 5$  in the range (0, 3) using the ant colony optimization method. Show detailed calculations for 2 iterations with 4 ants. 13 K2 CO4

15. a) Illustrate on Monte Carlo method in detail. 13 K2 CO5

**OR**

b) Discuss in detail about Bat Algorithm and Flower Pollination Algorithm with an example. 13 K2 CO5

**PART - C (1 × 15 = 15 Marks)**

16. a) Explain Ant colony optimization techniques with examples. 15 K2 CO6

**OR**

b) Explain Butterfly optimization algorithm with examples. 15 K2 CO6