20CS022 OPTIMIZATION TECHNIQUES

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	30	-	5	5	-

Course Description and Objectives:

The main objective of this course is to introduce the fundamental concepts of Optimization Techniques and to make the learners aware of the importance of optimizations in real scenarios. Most importantly to provide the concepts of various classical and modern methods of for constrained and unconstrainedproblems in both single and multivariable.Finally, the basic idea behind the evolutionary algorithms like Ant Colony Optimization,Particle Swarm Optimization could be discussed for further study.

Course Outcomes:

Upon the Completion of the course, students will be able to:

- ✓ Understand the classical, Linear programming and Transportation problem.
- ✓ Apply Single Variable Optimization problems and Multivariable Optimization problems.
- ✓ Identify the significance of evolutionary, Swarm Intelligence and Combinatorial Optimization Algorithms.

SKILLS:

- ✓ Effective use of resources in solving problems.
- ✓ Better utilization of optimization techniques.
- ✓ Gain a knowledge of various algorithms

UNIT I

Introduction to Classical Methods & Linear Programming Problems Terminology and Transportation Problems: Introduction to Classical Methods & Linear Programming Problems Terminology: Design Variables – Constraints, Objective Function - Problem Formulation.
Linear Programming Problem - Simplex method - Concept of Duality.
General Transportation Problem- The transportationtable finding in initial basic feasible solution, North-West corner method, Least cost method, Rowminima method, Column minima method.

UNIT II

Single Variable Optimization: Problems Optimality Criterion - Bracketing Method - Region Elimination Methods - Interval Halving Method - Fibonacci Search Method - Golden Section Method. Gradient Based Methods: Newton - Raphson Method - Bisection Method - Application to Root finding.

UNIT III

Multivariable Optimization Algorithms Optimality: Criteria - Unidirectional Search. Direct Search Methods: Hooke - Jeeves pattern search method. Gradient Based Methods: Cauchy's SteepestDescent Method - Newton's method.

UNIT IV

SIMPLE EVOLUTIONARY ALGORITHMS: What are Evolutionary Algorithms Used For? What areEvolutionary Algorithms? Simple Genetic Algorithm, Evolution Strategy and Evolutionary Programming,Direction - based Search.

UNIT V

COMBINATORIAL OPTIMIZATION: Introduction, Knapsack Problem, Traveling Salesman Problem.
SWARM INTELLIGENCE: Introduction, Ant Colony Optimization, Particle Swarm Optimization.

TEXT BOOKS:

1. Kanti Swarup, Man Mohan and P.K.Gupta, "Operations Research", Sultan Chand &Sons, 2005.
2. Mitsuo Gen and Xinjie Yu, "Introduction to Evolutionary Algorithms", Spinger, 2010.
3. S. S. Rao: Engineering Optimization, New Age International.
4. E. J. Haug and J.S. Arora, Applied Optimal Design, Wiley, New York.

REFERENCE BOOKS:

1. M.C. Bhuvaneswari, "Application of Evolutionary Algorithms for Multi-objectiveOptimization in VLSI and Embedded Systems", Spinger,2014.
2. Ashlock D, "Evolutionary Computation for Modeling and Optimization", Springer, 2006.
3. Kalyanmoy Deb, Optimization for Engineering Design, Prentice Hall of India, Second Edition, 2012.
4. A. Ravindran and K.M. Rogsdell, G.V. Reklaites, Engineering Optimization: Methods and Applications,Wiley, Second Edition, 2006.