OPTIMIZATION TECHNIQUES

Course Code	20EE4601D	**Year**	III	**Semester(s)**	II
Course Category	Professional Elective-II	**Branch**	EEE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Nil
Continuous Internal Evaluation:	**30**	**Semester End Evaluation:**	**70**	**Total Marks:**	**100**

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Understand** basics and theoretical concepts of optimization techniques.(L2)
CO2	**Apply** mathematical principles to formulate optimization problems. (L3)
CO3	**Investigate** the different classical methods to solve linear, non-linear programming problems and transportation problems. (L4)
CO4	**Solve** Linear Programming Problem using dynamic programming. (L3)
CO5	**Analyze** the performance of modern heuristic methods to solve optimization problems. (L4)
CO6	Get the ability to engage in independent study to make an effective presentation and submit report on optimization techniques concepts in various domains.

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3		1									2	2	
CO3		3	1										2	
CO4	3		1										2	
CO5		3	1		2							2	2	
CO6	3								3	3			2	

SYLLABUS		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction to optimization:** Statement of an optimization problem, classification of optimization problems, optimization techniques, Engineering applications of optimization	**CO 1 CO2 CO 6**
II	**Linear Programming (LP):** Introduction and formulation of models, standard form of Linear Programming Problem(LPP), assumptions in LPP, simplex method, simplex method using artificial variables, degeneracy in simplex method, duality, dual simplex method and sensitivity analysis-change in coefficients of objective function.	**CO 1 CO 3 CO 6**

III	**Transportation Problem:** Vogel‟s approximation method, modified distribution method. **Non-linear Programming:** Unconstrained problems of maxima and minima and constrained problems of maxima and minima, Lagrangian method and Kuhn Tucker conditions.	**CO 1** **CO 3** **CO 6**
IV	**Dynamic Programming:** Solution of linear programming problem, simple problems. **Modern Methods of Optimization-I**: Simulated Annealing: Introduction, Procedure, Algorithm, Features of the Method, Particle Swarm Optimization**:** Introduction, Computational Implementation of PSO, Improvement to the Particle Swarm Optimization Method, Solution of the Constrained Optimization Problem	**CO 1** **CO 4** **CO 5** **CO 6**
V	**Modern Methods of Optimization-II** Ant Colony Optimization: Basic Concept, Ant Searching Behavior, Path Retracing and Pheromone Updating, Pheromone Trail Evaporation, Algorithm Firefly Optimization Algorithm: Firefly Behavior, Assumptions, Procedure, Algorithm Teaching-Learning-Based Optimization (TLBO) – Algorithm	**CO 1** **CO 5** **CO 6**

Learning Resources
Text Books
[1] S.S.Rao, "*Engineering Optimization: Theory and Practice*",New Age International publishers, 5th edition., 2019 [2] S.D.Sharma, "*Operations Research*", Kedar Nath Ram Nath and Co, 4th Edition, 2014. [3] K.Deb, "*Optimization for Engineering Design: Algorithms and Examples*", Prentice Hall of India Learning Pvt. Ltd., 2nd edition. 2012.
Reference Books
[1] K.V.Mittal, C. Mohan, "*Optimization Methods in Operations Research and Systems Analysis*", New Age International, 1st edition, 1996. [2] H.A.Taha, "*Operations Research: An introduction*", Prentice Hall of India Learning Pvt. Ltd., 10th edition, 2019. [3] D.P.Kothari, J.S.Dhillon, "*Power System Optimization*", Prentice Hall of India Learning Pvt. Ltd., 2ndedition, 2011.
Web Links 1. https://nptel.ac.in/courses/111105039