						CWS	PRS	MTE	ETE	PRE
L	**T**	**P**	Credit	Area	**ME431 Optimization techniques**					
3	0/1	2/0	4	DEC/GEC		15/25	25	20/25	40/50	-

Objective: To allow students to develop the technical, analytic, and managerial skills necessary to perform the tasks successfully

Syllabus		Contact Hours
Unit-1	**Introduction to Optimization -** Introduction, Engineering Applications, Problem Statement, Classification of optimization problems.	**6**
Unit-2	**Classical Optimization techniques -** Unconstrained Optimization: Optimizing Single- Variable Functions, conditions for Local Minimum and Maximum, Optimizing Multi- Variable Functions. Constrained Optimization: Optimizing Multivariable Functions with Equality Constraint: Lagrange Multipliers Method. Constrained Multivariable Optimization with inequality constrained: Kuhn-Tucker Necessary conditions, Kuhn –Tucker Sufficient Conditions.	6
Unit-3	**Non-Linear Programming-** One-Dimensional Methods: Elimination Methods, Interpolation Methods, Direct Root Methods; Quasi-Newton Method, Secant Method. Docotomous search method, Fabonacci method, Golden section method, Unconstrained Optimization Techniques: Direct search methods, Descent Methods. Constrained Optimizations: Direct and Indirect methods.	8
Unit-4	**Dynamic Programming:** Concept of Dynamic Programming, Multi stage Decision Process, Calculus Method and Tabular Method	8
Unit-5	**Integer Programming –** Branch and bound Method, Cutting Plane Method.	6
Unit-6	**Introduction to Advanced Optimization Techniques** – Genetic Algorithms (GA), Simulated Annealing, Particle Swarm Optimization (PSO), Ant Colony Optimization (ACO), Neural Network, Separable Programming, Stochastic Programming, Monte Carlo Simulation.	**8**
	Total	**42**

Reference Book:	
1	**Operations Research**, Taha, H. A., PHI
2	**Optimization of Engineering Design**, "Deb, K." PHI
3	**Operations Research**, "D.S. Hira, P. K. Gupta" S. Chand
4	**Optimization techniques**, "Rao" New Age international
5	**Introduction to optimal design,** Jasbir Singh Arora, McGraw Hill International

Course Outcomes

CO1	To learn the techniques and applications of Engineering optimization.
CO2	Analyze characteristics of a general linear programming problem.
CO3	Apply basic concepts of mathematics to formulate an optimization problem
CO4	Analyse various methods of solving the unconstrained minimization problem.
CO5	Analyze and appreciate variety of performance measures for various optimization problems.
CO6	Use of simulation software for multi objective optimization.

CO-PO/PSO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	2	2	1	1	1	1	2	2	1	3
CO2	3	3	2	2	2	2	2	1	1	1	1	3	3	2	2
CO3	3	3	3	2	2	2	1	1	1	1	1	2	2	1	3
CO4	3	3	3	3	2	2	2	1	1	1	1	2	3	1	2
CO5	3	3	3	3	3	2	2	1	1	1	1	3	3	2	3
CO6	3	3	3	3	3	2	2	2	1	1	1	2	3	2	3