

Branch Name:	Mechanical Engineering
Semester/Year:	Semester VII / Forth Year
Subject Title:	Optimization Techniques
Subject Code:	1ET1010709
Pre-requisite:	Zeal to Learn the Subject

Course Objectives:

The study of Optimization Techniques emphasizes Mathematical Modeling problem solving and the effect of marginal change in parameters on the solution of the problem.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
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Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction to classical optimization techniques: Statement of an optimization problem -design vector -design constraints -constraint surface -objective function - objective function surfaces -classification of optimization problems	06	14
2	Classical optimization techniques: Single variable optimization –multi variable optimization without constraints –necessary and sufficient conditions for minimum / maximum – multivariable optimization with equality constraints.	08	20
3	Unconstrained Nonlinear Programming: One-dimensional minimization methods: classification, Fibonacci method and quadratic interpolation method.	06	14
4	Unconstrained Optimization Techniques: Univariate method, Powell's method and steepest descent method	06	12
5	Nonlinear Programming: Introduction and formulation of models, Classical optimization methods, equality and inequality constraints, Lagrange multipliers and Kuhn-Tucker conditions.	08	20
6	Dynamic Programming: Principle of optimality, Unconstrained Optimization Techniques: elimination methods, interpolation methods, direct and indirect search methods.	08	20

Course Outcomes:

1. Demonstrate knowledge and understanding of basic idea under laying optimization techniques
2. Understands most common standard optimization methods shows logical thinking in problem studying.

List of Reference Books:

1. Rao S.S. "Engineering optimization: Theory and practice"-, New age international (p) limited, 3rd edition.

2. Kalyanamoy Deb, “Optimization for Engineering Design Algorithms and Examples” Prentice Hall of India.
3. Arora J S, “Introduction to Optimum Design” Mc -Graw Hill.
4. Papalambros P.Y., Wilde d. j. Principles of Optimal Design (Modeling and Computation) Cambridge University Press, Second edition
5. Ravindran A, Reklaitis G.V, K. M. Ragsdell K.M, “Engineering Optimization: Methods And Applications “, Wiley, Second edition

E-Resources:

1. <https://nptel.ac.in/courses/105108127/>

Notes: Emphasis should be given to problem exercises based on the syllabus topics.