



KadiSarvaVishwavidyalaya
Faculty of Engineering & Technology
Master of Engineering Semester I
(Electrical Power System)
 (With effect from Academic Year 2017-18 (CBCS))

Subject Code: MEEE-106-N-B	Subject Title: INTRODUCTION TO OPTIMIZATION TECHNIQUES (Major Elective-II)
Pre-requisite	

- **Course Objective:**
- This kind of course is required to provide strong foundation for students interested in the manipulation of data, broadly defined. In particular, this course is highly recommended for students who are interested in machine learning, algorithms, data-mining, telecommunication, signal processing etc.
- Basic knowledge of linear algebra, Calculus and exposure to probability

Teaching scheme				Total Credit	EvaluationScheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
04	00	02	06	05	03	70	30	20	30	150

- **Outline of the Course:**

Sr. No	TitleoftheUnit	Minimum Hours
1	Introduction to Optimization	6
2	Classical Optimization Techniques	12
3	Linear Programming	12
4	Non-linear Programming	12
5	Modern methods of Optimization	12
6	Practical Aspects of Optimization	6

Total Hours (Theory): 60

Total Hours (Lab): 30

Total Hours: 90



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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weight age(%)
1	Introduction to Optimization: Mathematical formulation, Classification of optimization problems, Engineering applications of optimization	6	10
2	Classical Optimization Techniques: Single variable optimization, Constrained and unconstrained optimization, Direct substitution method, Lagrange's method of multi Kuhn-Tucker (KKT) conditions	12	20
3	Linear Programming: Linear programming problem- simplex method, Two Phases of the Simplex Method, duality, Mixed-integer programming. Goal programming, Quadratic Programming, Transportation models and its variants, Sequencing problem, Replacement theory.	12	20
4	Non-linear Programming: Elimination Method: Unrestricted Search, Exhaustive search, Dichotomous search, Interval-halving method, Fibonacci method, Golden section method. Interpolation Methods: Quadratic Interpolation, Cubic Interpolation,	12	20
5	Modern methods of Optimization: Simulated Annealing, Particle Swarm Optimization, Ant Colony Optimization, Taguchi's Method of Optimization.	12	15
6	Practical Aspects of Optimization: Genetic Algorithms, Optimization of Fuzzy Systems, Multi-objective Optimization	6	15
		60	100



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• **Instructional Method and Pedagogy:**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, which may carries five marks in overall evaluation.
- One internal exam of 30 marks is conducted as a part of mid semester evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carries a weight age of five marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar /Tutorial may be conducted and having share of five marks in the overall internal evaluation.

D Learning Outcome

Upon completion of the subject, students will be able to:

- Analyse real-life problems, especially logistics problems, through the use of mathematical modelling techniques.
- Gain familiarity with various modeling techniques to build mathematical models for real problems.
- Perform a critical valuation and interpretation of analysis and optimization results.
- Evaluate the basic concepts of multi-objective optimization, including the conditions for optimality and understand with ways to quantitative losses the expected lifecycle cost of a new system or product

E Text Books & Reference Books:

- S.S. Rao, *Engineering Optimization Theory and Practice*, New Age International (P) Ltd Publishers, Third enlarged edition.
- E.K.P. Chong and S. H. Zak, *An Introduction to Optimization*, 2nd Edn., Wiley India Pvt. Ltd., 2010.
- Jasbir S. Arora, *Introduction to Optimum Design*, Mc Graw Hill Publication, International edition 1989.
- *Optimization for Engineering Design Algorithms and Examples*, Kalyanmoy Deb, Prentice Hall, Third reprint 1998
- R. Fletcher *Practical Optimization* (2nd Edition) John Wiley & Sons, New York, 1987. Hamdy A. Taha, *Operations Research: An Introduction* 10th edition, Pearson Education, New Delhi.