SCHEME OF COURSE WORK

Course Details:

Course Title	**: Optimization Techniques**		
Course Code	**:13EE2205**	**L P C**	**:4 0 3**
Program:	**: M.Tech.**		
Specialization:	**: Power Electronics and Drives**		
Semester	**: I**		
Prerequisites	**: Partial differentiation, Matrices**		
Courses to which it is a prerequisite	**: Optimization Techniques**		

Course Outcomes (COs):

1	After the completion of the course, the student will be able to analyze any problem of optimization in an engineering system by formulating a mathematical model to the problem and solving it by the techniques that are presented to him.
2	The student will be able to design and produce products and systems both economically and efficiently by using optimization techniques.
3	The student will be able to solving linear, non linear, and integer problems by using optimization techniques.

Program Outcomes (POs):

A graduate of M.Tech (Power System Automation and Control) will be able to

1	Acquire in depth knowledge in the area of power system control and automation.
2	attain the ability to think critically and analyze complex engineering problems related to power system control and automation
3	Obtain the capability of problem solving and original thinking to arrive at feasible and optimal solutions considering societal and environmental factors
4	Extract information through literature survey and apply appropriate research methodologies, techniques and tools to solve power system problems.
5	Use the state-of-the-art tools for modeling, simulation and analysis of problems related to power systems
6	Attain the capability to contribute positively to collaborative and multidisciplinary research to achieve common goals
7	Demonstrate knowledge and understanding of power system engineering and management principles and apply the same for efficiently carrying out projects with due consideration to economical and financial factors.
8	Communicate confidently, make effective presentations and write good reports with engineering community and society
9	Recognize the need for life-long learning and have the ability to do it independently
10	Become socially responsible and follow ethical practices to contribute to the community for sustainable development of society.
11	Independently observe and examine critically the outcomes of his actions and reflect on to make corrective measures subsequently and move forward positively by learning through mistakes

Course Outcome Versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	M	M	S	S	M				M		
CO-2		M	S	M			M				
CO-3		M	S	M			M				

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	**INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES:** Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems – Single variable Optimization.	CO-1	Write about design space?	▫ Lecture ▫ Discussion ▫ Problem solving	Assignment (Week 2 - 4)
2	Multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints: Solution by method of Lagrange multipliers – multivariable	CO-1	Find maximum or minimum of a given function.	▫ Lecture ▫ Discussion ▫ Problem solving	Mid-Test 1 (Week 9)
3	Optimization with inequality constraints: Kuhn – Tucker conditions.	CO-1	Solve the following problem by using Kuhn tucker conditions.	▫ Lecture ▫ Discussion ▫ Problem solving	Quiz (Week 2 - 4)
4	**A. LINEAR PROGRAMMING:** Standard form of a linear programming problem – geometry of linear programming problems.	CO-3	Write the procedure for geometry of linear programming procedure.	▫ Lecture ▫ Discussion Problem solving	
5	Different types in simplex method, motivation to the simplex method – simplex algorithm, dual LP.	CO-3	Write the simplex method algorithm.	▫ Lecture ▫ Discussion Problem solving	
6	**B.INTEGER PROGRAMMING:** Gomory's cutting plane method, Branch and bound method.	CO-3	Define Gomory's constraint.	▫ Lecture ▫ Discussion Problem solving	
7	**TRANSPORTATION**	CO-2	Find the initial basic feasible	▫ Lecture	

	PROBLEM: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method.		solution by using north – west corner rule.	▫ Discussion Problem solving	
8	Testing for optimality of balanced transportation problems.	CO-2	Test the optimality of the given transportation problems.	▫ Lecture ▫ Discussion Problem solving	
9	**Mid Test-1**				
10	Testing for optimality of balanced transportation problems of different cases.	CO-2	What is degeneracy.	▫ Lecture ▫ Discussion ▫ Problem solving	
11	**UNCONSTRAINED NONLINEAR PROGRAMMING:** One – dimensional minimization methods:Classification, Fibonacci method and Quadratic interpolation method.	CO-3	Limitations of Fibonacci method.	▫ Lecture ▫ Discussion Problem solving	
12	Univariatemethod, Powell'smethod, steepest descent method.	CO-3	Write the procedure of steepest descent method.	▫ Lecture ▫ Discussion Problem solving	
13	Davidon-Fletcher-Powell method, problems	CO-3	Solve the given problem by using Davidon-Fletcher-Powell method.	▫ Lecture ▫ Discussion Problem solving	Assignment (Week 2 - 4)
14	**CONSTRAINED NON LINEAR PROGRAMMING:** Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method.	CO-3	Write the characteristics of a constrained problem.	▫ Lecture ▫ Discussion Problem solving	Quiz (Week 2 - 4)
15	Basic approaches of Interior and Exterior penalty function methods.	CO-3	Difference between Interior and Exterior penalty function methods	▫ Lecture ▫ Discussion Problem solving	Mid-Test 2 (Week 18)
16	Introduction to Convex Programming problem.	CO-3	What is convex Programming problem.	▫ Lecture ▫ Discussion Problem solving	
17	Interior and Exterior penalty function methods problems, Convex Programming problems.	CO-3	Solve the problem by using convex Programming problem.	▫ Lecture ▫ Discussion Problem solving	
18	**Mid Test-2**				
19/20	**END EXAM**				