OPTIMIZATION TECHNIQUES

Semester III (Computer Engineering)
SUB CODE: MECE301

TEACHING SCHEME (Credits and Hours):

Teaching scheme				**Total Credit**	**Evaluation Scheme**					
L	**T**	**P**	**Total**		**Theory**		**Mid Sem Exam**	**CIA**	**Pract.**	**Total**
Hrs	**Hrs**	**Hrs**	**Hrs**		**Hrs**	**Marks**	**Marks**	**Marks**	**Marks**	**Marks**
04	**02**	**00**	**06**	**06**	**3**	**70**	**30**	**20**	**0**	**120**

LEARNING OBJECTIVES:

The objective of this course is

- To enable students to learn and implement various optimization techniques
- To enable students to model real-world problems in optimization framework
- To enable students to apply various optimization models in computer-science context

OUTLINE OF THE COURSE:

Unit No	**Topics**
1	Mathematical preliminaries – linear algebra and multivariable calculus
2	Unconstrained and constrained optimization
3	Genetic algorithms
4	Linear programming
5	Non-linear programming

Total hours (Theory): 60

Total hours (Tutorial): 30

Total hours: 90

DETAILED SYLLABUS:

Sr. No	Topic	Lecture Hours	Weight age (%)
1	**Mathematical preliminaries** • Linear algebra and matrices • Vector space, eigen analysis • Elements of probability theory • Elementary multivariable calculus	5	10
2	**Unconstrained and constrained optimization** • One-dimensional search methods • Gradient-based methods • Conjugate direction and quasi-Newton methods	15	20
3	**Genetic Algorithms** • Basics of genetic algorithms • Analysis	10	10
4	**Linear Programming** • Introduction to linear programming model • Simplex method • Duality • Karmarkar's method	15	25
5	**Non-linear problems** • Non-linear constrained optimization models • KKT conditions • Projection methods	15	35

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

STUDENTS LEARNING OUTCOMES:

On successful completion of the course, the student will:

- Be able to learn and implement various optimization techniques
- Be able to learn model real-world problems in optimization framework
- students will apply various optimization models in computer-science context

REFERENCE BOOKS:

1. Introduction to Optimization – Edwin K P Chong, Stainslaw H Zak
2. Nonlinear programming – Dimitry Bertsekas