OPTIMIZATION TECHNIQUES

Course code	23ME2702A	Year	IV	Semester	I
Course category	Open Elective-IV	Offering Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	BTL	Units
CO1	Classify optimization problems and apply classical techniques for single and multivariable optimization	Apply	L3	1
CO2	Solve unconstrained problems using methods like pattern search, Rosenbrock's, simplex, and steepest descent	Apply	L3	2
CO3	Apply penalty methods, feasible direction methods, and solve convex programming problems.	Apply	L4	3
CO4	Solve G.P. and C.G.P problems using primal-dual concepts and differential or arithmetic methods.	Apply	L3	4
CO5	Solve integer and zero-one programming problems using Gomory's cutting plane and other algorithms	Apply	L3	5

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

Syllabus		
UNIT	Contents	Mapped CO
I	**INTRODUCTION TO OPTIMIZATION:** Engineering applications of optimization- statement of an optimization problem- classification of optimization problems. **CLASSICAL OPTIMIZATION TECHNIQUES:** Single variable optimization- multivariable optimization with equality constraints-Method of Lagrange Multipliers, multivariable optimization with inequality constraints-Kuhn–Tucker Conditions.	CO1
II	**UNCONSTRAINED OPTIMIZATION TECHNIQUES:** Pattern search method- Powell's Method, Simplex method. Descent methods:- Gradient of function- Steepest Descent method.	CO2
III	**CONSTRAINED OPTIMIZATION TECHNIQUES:** Characteristics of constrained problem, methods of feasible directions: basic approach in the penalty function method- interior penalty function method- convex programming problem- exterior penalty function method.	CO3
IV	**GEOMETRIC PROGRAMMING (G.P):** Solution of an unconstrained geometric programming, differential calculus method and arithmetic method. primal dual relationship and sufficiency conditions. Solution of a constrained geometric programming problem (G.P.P). Complimentary geometric programming (C.G.P)	CO4
V	**INTEGER PROGRAMMING (I.P):** Graphical representation. Gomory's cutting plane method-All-Integer Programming Problems. Algorithm for	CO5

	zero-one programming problem. Branch-and-Bound Method, Integer non-linear programming.	

Learning Resource
Text books:
1. Optimization Theory and Applications/ S.S.Rao/Wiley Eastern Limited, New Delhi
Reference books
1. Engineering Optimization / Kalyanmanai Deb/Prentice Hall of India, New Delhi. 2. Optimization Techniques-Theory and applications/C.Mohan&Kusum Deep/New Age International 3. Operations Research /S.D.Sharma / MacMillan Publishers
E-Resources & other digital Material:
1. http://nptel.ac.in/courses/112106134/ 2. http://nptel.ac.in/courses/112106131/