

Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech.	Optimization Techniques	MEE 501	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
I	4	3-1-0	3 Hours

Unit-I

Introduction to Optimization: Formulation of optimization problem; Classification of optimization problems; Optimum design of components like pins; beams; Columns; shafts; Spur gears; Pressure vessels. **(08 Hours)**

Unit -II

Linear Programming: Introduction; simplex method and duality in linear programming; Sensitivity or post-optimality analysis; Karmarkar's method; Problems. **(06 Hours)**

Unit -III

One Dimensional Minimization: Optimality criterion; minimum bracketing methods like exhaustive search method; Bounding phase method; Optimum seeking methods like interval halving; Golden section search; Successive quadratic estimation; Newton Raphson; Bisection; secant; Cubic search method. **(08 Hours)**

Unit -IV

Multivariable Unconstrained Optimization: Optimality criteria; direct search methods like evolutionary optimization method; Powell's conjugate direction method; gradient search methods like Cauchy's method; Newton's method; conjugate gradient method and variable metric method. **(08 Hours)**

Unit -V

Constrained Optimization: Optimality conditions; Optimization methods like penalty function method; Method of multipliers; Variable elimination method; Complex search method; Random search method; Cutting plane method; Feasible direction method; Generalized reduced gradient method. **(08 Hours)**

Unit -VI

Optimization Programming: Introduction of programming techniques; Geometric programming; Integer programming methods like penalty function and branch and bound method. **(07 Hours)**

Recommended Books:

1. Engineering Optimization Theory and Practice; S. S. Rao; New age international Ltd.; 1st Ed.; 1996.
2. Optimization for Engineering Design; Kalyanmoy Deb; Prentice Hall of India; New Delhi; 2nd Ed.; 2005
3. Introduction to Optimum Design; J. S. Arora; McGraw Hill; New York; 3rd Ed.; 1989.
4. Optimizing Performance of Energy Systems; S. S. Stricker; Battelle Press; New York; 1st Ed.; 1985.
5. Optimum Design of Mechanical Elements; R.C. Johnson; Willey; New York; 1st Ed.; 1980.