

MA-405: OPTIMIZATION THEORY

Introduction to optimisation. Relative and absolute extrema. Convex, concave and unimodal functions. Constraints. Mathematical programming problems. Optimisation of one, two and several variables functions and necessary and sufficient conditions for their optima. **Optimisation by equality constraints:** Direct substitution method and Lagrange multiplier method, necessary and sufficient conditions for an equality constrained optimum with bounded independent variables. Inequality constraints and Lagrange multipliers. Kuhn-Tucker Theorem. Multidimensional optimisation by Gradient method. Convex and concave programming. Calculus of variation and Euler Lagrange equations. Functionals depending on several independent variables. Variational problems in parametric form. Generalised mathematical formulation of dynamics programming. Non-linear continuous models. Dynamics programming and variational calculus. Control theory.

RECOMMENDED BOOKS:

1. Gotfried B. S and Weisman, J., Introduction to Optimization Theory, Prentice-Inc., New Jersey, 1973.
2. Elsgolts L., Differential Equations and the Calculus of variations, Mir Publishers, Moscow, 1970.
3. Wismer D. A and Chattergy R., Introduction to Nonlinear Optimization, North Holland, New York, 1978.
4. Intriligator M.D., Mathematical Optimization and Economic Theory, Prentice-Hall, Inc., New Jersey, 1971.