GUJARAT TECHNOLOGICAL UNIVERSITY

Power Electronics

M.E. Semester: II

Subject Name: **Optimization Techniques (Major Elective –II)**

Sr. No.	Course Content
1.	**Optimization:** Basic concept, Mathematical formulation of problems; Classification of Optimization. Problems - single variable problems, Multivariable problems without constraints, Multivariable problems with constraints, Maximization and minimization problems, Convex and concave functions, Necessary and sufficient conditions for stationary points.
2.	**Optimization of Unconstrained Functions Search:** Analytical methods, Numerical methods, Scanning and bracketing Techniques, Region elimination techniques.
3.	**Multivariable Search – Analytical Methods:** Classification, Stationary points, Direct substitution, constrained variation, penalty function, Lagrangian Multiplier, Kuhn-Tucker theorem, Simplex Method of Linear Programming, Duality, Quadratic programming, Geometric Programming. Stochastic Programming.
4.	**Multivariable Search – Numerical Methods:** General principles of numerical search, direction of search, final stage in search, direct search, pattern search, acceleration in direct search, gradient methods, Box method.
5.	**Non- Linear Programming:** Quadratic programming, Generalized reduced gradients methods, Successive linear and successive quadratic programming, Dynamic programming, Integer and mixed integer programming. Stochastic Programming.
6.	**Case studies of optimization in Engineering.**

Reference Books:

1. Optimization Theory and Practice by Gordon S.G. Beveridge and Robert S. Schechter (McGrawHill)
2. Optimization –Theory and applications by S. S.Rao (Wiley Eastern)
3. Optimization for Engineering design – algorithms and examples by K. Deb (Prentice and Hall)
4. Introduction to the Theory of Nonlinear Optimization by Johannes Jahn (Springer)