

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: III

Chemical Engineering

Subject Name: **Advance Process Optimization**

Subject Code: **733001**

Sr. No	Course content
1.	Introduction to Optimization: Basic concept of optimization, Mathematical formulation of optimization problems; Classification of Optimization Problems - single variable problems, Multivariable problems without constraints, Multivariable problems with constraints, Maximization and minimization problems,
2.	Optimization of Unconstrained Functions One-Dimensional Search: analytical methods, Numerical methods, scanning and bracketing techniques, region elimination techniques, examples.
3.	Multivariable Search – Analytical Methods: Classification, stationary points, direct substitution, constrained variation, penalty function, Kuhn-Tucker theorem, Quadratic programming, Geometric 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, the complex method of Box
5.	Non- Linear Programming With Constrained And Its Applications: Quadratic programming, Generalized reduced gradients methods, Successive linear and successive quadratic programming, Dynamic programming, Integer and mixed integer programming.
6.	Application of Optimization In Chemical Engineering: Optimization of staged and discrete processes, Optimization of liquid-liquid extraction process, Economic Operation of a fixed-bed filter
7.	Nontraditional Optimization Techniques: Statistical Optimization Techniques - Genetic Algorithm, Simulated Annealing, Ant Colony Optimization, TABU search, Multi Objective Optimization.
8.	Artificial Neural Network, Fuzzy logic

Reference Books:

1. Optimization in Chemical processes, Edgar, Himmeiblauf, Lasdon, by McGrawHill Publication
2. Optimization Theory and Practice, Gordon S.G. Beveridge and Robert S. Schechter, by McGrawHill Publication
3. Engineering Optimization –Theory and Practice, Singiresu S.Rao, Published by New Age International publishers
4. Product and Process Design Principles, Warren D Seider, J. D. Seader, Daniel R Lewin, by John Wiley and Sons, Inc.
5. Systematic Methods of Chemical Process Design, Lorens T. Biegler, E. Ignacio grossmann, Arthur W Westerberg, by PHI
6. Engineering Optimization Methods and Applications, Reklaities F. V., Ravindan A. and Ragsdell K. M., John Willy, New York, 1983.