Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NMCD551	Topics in Advanced Optimization	3	0	0	3

Course Objective
The course deals with the basic idea of Optimization techniques. We shall see how simple mathematics plays a significance role in the development of these ideas. Further, explore the different approaches to find the solution for the various Optimization Problems.
Learning Outcomes
The student will able to identify the appropriate methods to solve the different kinds of Optimization Problems.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Queuing Theory: Structure of a Queuing System, Performance Measures of Queuing System, Probability Distributions in Queuing System, Single Server Queuing Models.	8	Students will analyze the variety of performance measures of a queuing system.
2	Inventory Control: Deterministic Inventory problems with Shortages and without Shortages, problems of EOQ with price breaks, Systems of Inventory Control, One Period problem with Set-Up Cost and without SetUp Cost.	8	Students will understand the meaning of inventory control as well as the use of various selective inventory control techniques to classify inventory items into broad categories.
3	Goal Programming: Concept of Goal Programming, Model Formulation, Difference between LP and GP Approach, Graphical Solution Method for GP, Modified Simplex Method for GP	8	This will help in distinguish between LP and GP methods for solving a business decision problem
4	Simulation: Types, Advantages and Disadvantages of Simulation, Monte Carlo Simulation, Simulation of Inventory and queuing Problems. Markov Analysis: Characteristics of a Markov Chain, State and Transition Probabilities, Multi-Period Transition Probabilities.	8	To understand the basic concept of the simulation and apply Monte Carlo simulation technique for solving various types of problems. They will be able to construct a matrix of transition probabilities to compute long-term steady-state conditions
5	Classical Optimization Methods**:** Unconstrained optimization problem, optimizing multivariable functions, Constrained multivariable optimization with equality constraints: Direct substitution method, Lagrange multipliers method, Constrained multivariable optimization with inequality constraints: Kuhn-Tucker Necessary and Sufficient Conditions, Saddle-Point Criteria	10	Students will drive Kuhn-Tucker necessary conditions for an optimal solution for the constrained and unconstrained optimization problem.
	Total	**42**	

Text Books:

1. Johannes Jahn, Introduction to the Theory of Nonlinear Optimization, Third Edition, Springer, 2007.

2. J. Jahn, Vector Optimization - Theory, Applications, and Extensions, Springer, 2004.

Reference Books:

3. H.A. Taha, Operationals Research: An Introduction, 1971.

4. F.S. Hillier and G.J. Libeberman, Introduction to Operationals Research, 1967.