CS306: Optimization Techniques	L	T	P	Nil
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Course Objective: To familiarize with various optimization techniques and their applications.

S. No.	Course Outcomes (CO)
CO1	Apply linear programming methods, including the Simplex method and post-optimality analysis.
CO2	Understand duality theory and solve linear programming problems using various algorithms.
CO3	Utilize dynamic programming for deterministic and probabilistic optimization problems.
CO4	Implement integer programming techniques, including branch-and-bound for binary and mixed integer problems.
CO5	Apply nonlinear programming methods, including KKT conditions and various optimization techniques.
CO6	Analyze and model queuing systems using queuing theory and associated processes.

S. No	Contents	Contact Hours
UNIT 1	Linear Programming Models, Prototype, Examples, Assumptions of Linear Programming, Additional Examples, Some Classic Case Studies. Graphical method, The Simplex Method: The Essence of the Simplex Method, Setting up the Simplex Method, The Algebra of the Simplex Method, The Simplex Method in Tabular Form, Tie Breaking in the Simplex Method, Adapting to Other Model Forms, Post optimality Analysis.	8
UNIT 2	Duality theory and Essence of Duality Theory, Economic Interpretation of Duality, Primal-Dual relationships, Adapting to Other Primal Forms, The Role of Duality Theory in Sensitivity Analysis. Algorithms for Linear Programming:The Dual Simplex Method, Parametric Linear Programming, the Upper Bound Techniques, An Interior-Point Algorithm.	8
UNIT 3	Dynamic programming, prototype example for Dynamic Programming, Characteristics of Dynamic Programming Problems, Deterministic Dynamic Programming, Probabilistic Dynamic Programming.	8
UNIT 4	Integer Programmingand Prototype Example, Some BIP Applications, Innovative Uses of Binary Variables in Model Formulation, Some Formulation examples, Some Perspectives on Solving Integer Programming Problems, The Branch-and-Bound Technique and Its application to Binary Integer Programming, A Branch-and-Bound Algorithm for Mixed Integer.	8
UNIT 5	Nonlinear Programming and Sample Applications, Graphical Illustration of Nonlinear Programming Problems, Types of Nonlinear Programming Problems, One-Variable Unconstrained Optimization, Multivariable Unconstrained Optimization, The Karush-Kuhn-Tucker (KKT) Conditions for Constrained Optimization, Quadratic Programming, Separable Programming , Convex Programming.	8
UNIT 6	Discussion about the Queuing Theory and Prototype Example, Basic Structure of queuing Models, Examples of Real Queuing Systems, The role of the Exponential Distribution, The Birth-and-Death Process, Queuing Models Based on the Birth-and Death Process, Queuing Models involving non exponential distributions.	8

	Total	**48**