

PROGRAMME NAME: : B.Sc. (H) Mathematics

COURSE NAME : Linear Programming and Applications

SEMESTER DURATION : January to May

Week	Topic(s)	Teaching Methodology Adopted/ Continuous Internal Evaluation
1	The Linear Programming Problem: Standard, Canonical and matrix forms, Graphical solution.	Lectures
2	Hyperplanes, Extreme points, Convex and polyhedral sets; Basic solutions. Basic Feasible Solutions	Discussions
3	Reduction of any feasible solution to a basic feasible solution; Correspondence between basic feasible solutions and extreme points.	Lectures
4	Simplex Method: Optimal solution, Termination criteria for optimal solution of the Linear Programming Problem, Unique and alternate optimal solutions, Unboundedness.	Presentations
5	Simplex Algorithm	Lectures
6	Simplex Algorithm's Tableau Format	Demonstration
7	Artificial variables	Assignments
8	Two-phase method, Big-M method.	Lectures
9	Motivation and Formulation of Dual problem	Tutorials
10	Primal-Dual relationships.	Presentation
11	Statements of the Fundamental Theorem of Duality and Complimentary Slackness Theorem with examples.	Lectures
12	Transportation Problem	Discussions
13	Assignment problem.	Discussions
14	Game Theory: Basic concept, Formulation and solution of two-person zero-sum games, Games with mixed strategies, Linear Programming method of solving a game.	Practical

Course Objectives: This course develops the ideas underlying the Simplex Method for Linear Programming Problem, as an important branch of Operations Research. The course covers Linear Programming with applications to Transportation, Assignment and Game Problem. Such problems arise in manufacturing resource planning and financial sectors.

Course Learning Outcomes:

This course will enable the students to learn:

- i) Analyze and solve linear programming models of real-life situations.
- ii) The graphical solution of LPP with only two variables, and illustrate the concept of convex set and extreme points. The theory of the simplex method is developed.
- iii) The relationships between the primal and dual problems and their solutions with applications to transportation, assignment and two-person zero-sum game problem.