



Indraprastha College for Women

University of Delhi

Course Name:	B.Sc. (Hons.) Mathematics
Paper Title:	Linear Programming and Applications
Unique Paper Code:	
Semester:	V
Faculty(s):	Ashutosh Rajput
Year:	2024

Work Plan			
Period	Unit No.	Learning Objective	Topics to be Covered
1 st Aug – 3 rd Aug	Unit I: Introduction to Linear Programming	1. Simplex Method for linear programming problems.	Linear programming problem: Standard, Canonical and matrix forms
5 th Aug- 10 th Aug		2. Dual linear programming problems.	Linear programming problem: Standard, Canonical and matrix forms
12 th Aug- 17 th Aug		3. The applications of linear Programming to transportation, assignment, and game theory	Geometric solution; Convex and polyhedral sets, Hyperplanes
19 th Aug- 24 th Aug			Extreme points; Basic solutions, Basic feasible solutions,
26 th Aug- 31 st Aug			Correspondence between basic feasible solutions and extreme points.
2 nd Sep- 7 th Sep	UNIT– II: Optimality and Duality Theory of Linear Programming Problem		Simplex method: Optimal solution
9 th Sep- 14 th Sep			Termination criteria for optimal solution of the linear programming problem
16 th Sep- 21 st Sep			Unique and alternate optimal solutions, Unboundedness
23 rd Sep- 28 th Sep			Simplex algorithm and its tableau format; Artificial variables
30 th Sep - 5 th Oct			Two-phase method, Big-M method
7 th Oct- 12 th Oct			Duality Theory: Motivation and formulation of dual problem, Primal-Dual relationships
14 th Oct- 19 th Oct			Fundamental theorem of duality; Complementary slackness
21 st Oct- 26 th Oct	UNIT – III: Applications		Transportation Problem: Definition and formulation, Northwest-corner method, Least- cost
28 th Oct- 2 nd Nov			MID SEMESTER BREAK

4 th Nov-9 th Nov			Vogel's approximation methods of finding initial basic feasible solutions, Algorithm for solving transportation problem
11 th Nov-16 th Nov			Assignment Problem: Mathematical formulation and Hungarian method of solving
18 th Nov-23 rd Nov			Game Theory: Two-person zero sum game, Games with mixed strategies
25 th Nov-27 th Nov			Formulation of game to primal and dual linear programming problems, Solution of games using duality
28 th Nov	DISPERSAL OF CLASSES		

Unit	TOPICS
I	Introduction to Linear Programming Linear programming problem: Standard, Canonical and matrix forms, Geometric solution; Convex and polyhedral sets, Hyperplanes, Extreme points; Basic solutions, Basic feasible solutions, Correspondence between basic feasible solutions and extreme points.
II	Optimality and Duality Theory of Linear Programming Problem Simplex method: Optimal solution, Termination criteria for optimal solution of the linear programming problem, Unique and alternate optimal solutions, Unboundedness; Simplex algorithm and its tableau format; Artificial variables, Two-phase method, Big-M method. Duality Theory: Motivation and formulation of dual problem, Primal-Dual relationships, Fundamental theorem of duality; Complementary slackness.
III	Applications Transportation Problem: Definition and formulation, Northwest-corner, Least-cost, and Vogel's approximation methods of finding initial basic feasible solutions; Algorithm for solving transportation problem. Assignment Problem: Mathematical formulation and Hungarian method of solving. Game Theory: Two-person zero sum game, Games with mixed strategies, Formulation of game to primal and dual linear programming problems, Solution of games using duality.
S. No.	Name of Authors/Books/Publishers
1.	Bazaraa, Mokhtar S., Jarvis, John J., & Sherali, Hanif D. (2010). Linear Programming and Network Flows (4th ed.). John Wiley and Sons. Indian Reprint.
2.	Hillier, Frederick S. & Lieberman, Gerald J. (2021). Introduction to Operations Research (11th ed.). McGraw-Hill Education (India) Pvt. Ltd.
3.	Taha, Hamdy A. (2017). Operations Research: An Introduction (10th ed.). Pearson.
4.	Hadley, G. (1997). Linear Programming. Narosa Publishing House. New Delhi.