Course Code	Course Title	L	T	P	C
PMDS607L	Optimization Techniques	3	0	0	3
Pre-Requisite	NIL	Syllabus Version			
		1.0			

Course Objectives

1. To familiarize the students with some basic concepts of optimization techniques and approaches.
2. To formulate a real-world problem as a mathematical programming model.
3. To develop the model formulation and applications are used in solving decision problems.
4. To solve specialized linear programming problems like the transportation and assignment Problems.

Course Outcomes

At the end of the course, the student will be able to :

1. Understand the operations research techniques like linear programming problem.
2. Apply the linear programming problem in industrial optimization problems.
3. Solve allocation problems using various operations research methods.
4. Understand the characteristics of different types of decision-making environment and the appropriate decision-making approaches and tools to be used in each type.
5. Recognize competitive forces in the marketplace and develop appropriate reactions based on existing constraints and resources.

Module: 1	Introduction to Operations Research and Linear Programming Problems	6 hours

Introduction to Operation Research, Mathematical Models, Scope and applications of Operation Research - Mathematical formulation of Linear Programming - Limitations or constraints, Problem (LPP): Methods for solution, Graphical analysis, LPP, Graphical LPP Maximization Problems, and Minimization problems.

Module: 2	Basic LPP Problem	6 hours

Linear programming to standard form, Simplex Method: Basics of Simplex Method, Simplex Method with two variables, Simplex Method with more than two variables and Big M Method.

Module: 3	Dual Linear Programming Problem	7 hours

Introduction to Primal and Dual problems - Duality theorem - Dual problem properties - Solution techniques of Dual Problem - Dual Simplex Method - Relationship between direct and dual problems - Economic interpretation of Duality.

Module: 4	Transportation and Assignment Problem	6 hours

Introduction: Transportation Problem-Balanced-Unbalanced-Methods of basic feasible solution - Optimal solution-MODI method. Assignment problem-Hungarian Method.

Module: 5	Non-Linear programming Problems	6 hours

Method of Lagrange multipliers, Kuhn-Tucker theory, convex optimization, Quadratic optimization

Module: 6	Network Analysis	6 hours

Basic concepts-Construction of Network-Rules and precautions- Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) Networks-Crashing a Network as LPP - Probability and cost consideration.

Module: 7	**Game Theory**	**6 hours**
Introduction to Two Person Zero-Sum Game-Solution of games with saddle points and without saddle points - 2×2 games-dominance principal m×2 and 2×n games - Graphical method.		
Module: 8	**Contemporary Issues**	**2 Hours**
	Total Lecture Hours	**45 Hours**

Text Book(s)	
1	Hamdy Taha, Operations Research, 10th edition, Prentice Hall India, 2019
2	P. K. Gupta and D. S. Hira, Operations Research, 2018, S. Chand & co.
Reference Book(s)	
1	S.D. Sharma, Operations Research, 2000, Nath & Co., Meerut.
2	Maurice Solient, Arthur Yaspen, Lawrence Fridman, OR methods and Problems, 2003, New Age International Edition.
3	J K Sharma, Operations Research Theory & Applications, 2007, 3rd Edition, Macmillan India Ltd.

Mode of Evaluation: CAT, Assignment, Quiz and FAT.			
Recommended by Board of Studies	15-02-2024		
Approved by Academic Council	No. 73	Date	14-03-2024