PVP 23

PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)
Kanuru, Vijayawada-520007

II B. Tech – II Semester

OPTIMIZATION TECHNIQUES

(Common to IT,CSE(AI&ML),CSE(DS))

Course Code	23HS1403	**Year**	II	**Semester**	II
Course Category	PCC	**Branch**	IT, CSE(AI&ML), CSE(DS)	**Course Type**	Theory
Credits	2	**L – T – P**	2-0-0	**Prerequisites**	Mathematics
Continuous Internal Evaluation	30	**Semester End Examination**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		
CO1	Understand foundational principles in operations research and optimization, including linear programming and resource allocation models.	L2
CO2	Formulate and solve linear programming problems using the simplex method, analyze duality relationships, and perform sensitivity analysis.	L3
CO3	Apply transportation, assignment, scheduling, and network models in logistics and supply chain contexts.	L3
CO4	Utilize goal programming, game theory, and decision analysis techniques for multi-objective and competitive decision-making situations.	L3
CO5	Analyze inventory models and conduct break-even analysis for cost effective resource management and project planning.	L4
CO6	Demonstrate proficiency in optimization software and apply optimization methods to real-world case studies in engineering and management.	L2

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	2	-	1	-	-	-	1	3	1
CO2	3	3	1	2	1	2	-	1	-	-	-	1	3	1
CO3	3	3	-	1	1	1	-	1	-	-	-	1	3	2
CO4	3	3	-	2	1	1	-	1	-	-	-	1	3	2
CO5	3	2	1	2	1	1	-	1	-	-	-	1	3	1
CO6	3	2	-	2	1	1	-	1	-	-	-	1	3	2

Syllabus		
Unit No.	**CONTENTS**	**Mapped CO**
I	**Introduction to Operations Research and Linear Programming** **Overview of Operations Research**: Scope, applications, and model-building in OR. **Basics of Linear Programming (LP):** Objective function, constraints, feasible region, and graphical solution. **Simplex Method**: Algorithm and applications for solving LP problems. **Special Cases in Simplex**:Degeneracy,unbounded,and infeasible solutions	**CO1,CO2**
II	**Transportation and Assignment Problem** **Transportation Problem:** Formulation, initial feasible solution, and optimality tests. **Assignment Problem:** Solving using the Hungarian method.	**CO3**
III	**Sequencing and Project Scheduling** **Sequencing Problems:** Basic concepts, Gantt charts, job sequencing, single machine, and multi-machine scheduling problems. **PERT/CPM Models:** Shortest path problems, maximum flow problems,and applications in project scheduling.	**CO5**
IV	**Inventory Theory and Break-even Analysis** **Inventory Models:** Economic Order Quantity (EOQ), safety stock, and probabilistic inventory models. **Break-even Analysis:** Applications in financial planning and cost management.	**CO5**
V	**Game Theory and Decision Analysis** **Game Theory:**Concepts of zero-sum games,min max theorem,and Nash equilibrium. **Decision Analysis:** Decision-making under uncertainty,decision trees,and expected value criteria.	**CO4**

Learning Resources
Text Books
1. "Operations Research"by P Sankara Iyyer, McGraw Hill Publications,2016. 2. "Operations Research: An Introduction"by Hamdy A.Taha, Pearson Publications, 9th edition, 2019. 3. "Operations Research"by R Panneer selvam,PHI Publication,2nd edition, 2010.

Reference Books

1. "Optimization in Operations Research" by Ronald L.Rardin.
2. "Introduction to Optimization" by Pablo Pedregal.
3. "Operations Research: Principles and Practice"by Ravindran, Phillips, and Solberg.

E-Resources & other digital material

1. Institute for Operations Research.
2. Analytics Vidhya on Operations Research.
3. NPTEL Course on Operations Research