Course Code	**18CIPE51C**				
Category	Engineering Science Courses : Professional Elective				
Course title	**OPERATIONS RESEARCH – THEORY**				
Scheme and Credits	No. of Hours/Week				Semester - V CSE/ISE
	L	T	P	SS	Credits
	2	2	0	0	3
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100		Duration of SEE: 03 Hours	
Prerequisites (if any): NIL					

COURSE OBJECTIVES:

The students will be able to

` Formulate Optimization Problem as a Linear Programming Problem.

Solve the Problems using Simplex Method.

Optimize the problems by using Revised and Dual Simplex methods.

Formulate and Solve Transportation and Assignment Problems.

Apply Game Theory for Decision Making Problems.

UNIT I: INTRODUCTION & LINEAR PROGRAMMING   09 Hours

Introduction: The origin, nature and impact of OR; Defining the problem and gathering data; Formulating a mathematical model; Deriving solutions from the model; Testing the model; Preparing to apply the model; Introduction to Linear Programming Problem (LPP):Prototype example, Assumptions of LPP, Formulation of LPP and Graphical method various examples.

UNIT II: SIMPLEX METHOD –1   10 Hours

The essence of the Simplex method; Setting up the Simplex method; Types of variables, Algebra of the Simplex method; the Simplex method in tabular form; Tie breaking in the Simplex method, Big M method, Two phase method.

UNIT III: SIMPLEX METHOD –2   09 Hours

Revised Simplex Method, Duality Theory - The essence of duality theory, Primal dual relationship, conversion of primal to dual problem and vice versa. The Dual Simplex method.

UNIT IV: TRANSPORTATION AND ASSIGNMENT PROBLEMS   10 Hours

The Transportation problem, Initial Basic Feasible Solution (IBFS) by North West Corner Rule method, Matrix Minima Method, Vogel's Approximation Method. Optimal solution by Modified Distribution Method (MODI). The Assignment problem; A Hungarian algorithm for the Assignment problem. Minimization and Maximization varieties in Transportation and Assignment problems.

UNIT V: GAME THEORY   10 Hours

Game Theory: The formulation of Two Persons, Zero Sum games; Saddle Point, MaxiMin and MiniMax principle, Solving simple games- a prototype example; Games with Mixed Strategies; Graphical solution procedure. Decision Analysis: Decision making without Experimentation, Decision making with Experimentation, Decision Trees.

TEXT BOOKS:

Frederick S. Hillier, Gerald J. Lieberman, Bodhibrata Nag, Preetam Basu, *Introduction To Operations Research,* 10th Edition, Tata McGraw-Hill Education India, 2017.

S D Sharma*: Operations Research*, Kedarnath, Ramanath and Company, 2012.

REFERENCE BOOKS:

Richard Chase, Ravi Shankar, F. Robert Jacobs, Operations and Supply Chain Management, 14th Edition, McGraw-Hill.

Hamdy A. Taha, *Operations Research: An Introduction,* 9th Edition, Prentice Hall, India, 2010.

Wayne L Wilson: Operations Research Applications and Algorithms, 4th Edition, Cengage Learning, 2003.

Premkumar Gupta, D S Hira: Operations Research, S Chand Publications, New Delhi, 7th Edition, 2012.

Sharma J K: Operations Research: Theory and Applications, 6th Edition, Macmilan, 2016.

e–BOOKS/ONLINE RESOURCES:

Operations Research
https://faculty.psau.edu.sa/filedownload/doc-6-pdF-14b14198b6e2615b7eba06b390ab763-original.pdf

Principles-of-mathematics-in-operations-research
https://itslearningakarmazyan.files.wordpress.com/2015/09/operation-research-applcations-and-algorithms.pdf

Introduction to Operations Research
https://notendur.hi.is/~kth93/3.20.pdf

MOOCs:

https://swayam.gov.in/course/1342-introduction-to-operations-research
https://onlinecourses.nptel.ac.in/noc15mg01/preview.
https://nptel.ac.in/courses/112106134/

COURSE OUTCOMES:

The students at the end of the course, will be able to

CO1: Identify and Formulate LP Problems for Maximization and Minimization Problems.
CO2: Solve Optimization Problems using Simplex Method.
CO3: Solve and Optimizer Dual and Revised-Simplex Methods.
CO4: Model the given Problem as Transportation, Assignment Problem and Solve.
CO5: Apply Game Theory for Decision Support System.

SCHEME OF EXAMINATION:

CIE – 50 Marks	Test I (Any Three Units) – 20 Marks	Quiz I – 5 Marks	25 Marks	Total: 50 Marks
	Test II (Remaining Two Units) – 20 Marks	Quiz II – 5 Marks	25 Marks	
SEE – 100 Marks	**Q1 (Compulsory):** MCQs or Short answer type questions for 15 Marks covering entire syllabus.		15 Marks	Total: 100 Marks
	Q2 & Q3 from Units which have 09 Hours are compulsory.		17*2= 34 Marks	
	Q4 or Q5, Q6 or Q7 and Q8 or Q9 from Units which have 10 Hours shall have Internal Choice.		17*3= 51 Marks	

Note: SEE shall be conducted for 100 Marks and the Marks obtained is scaled down to 50 Marks.

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