



Course Code	Advanced Data Structures & Algorithms			L	T	P	C
20A05301T	(Common to CSE, IT, CSE(DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)			3	0	0	3
Pre-requisite	Data Structures	Semester	III				
Course Objectives:							
<ul style="list-style-type: none">Learn asymptotic notations, and analyze the performance of different algorithms.Understand and implement various data structures.Learn and implement greedy, divide and conquer, dynamic programming and backtracking algorithms using relevant data structures.Understand non-deterministic algorithms, polynomial and non-polynomial problems.							
Course Outcomes (CO):							
After completion of the course, students will be able to <ul style="list-style-type: none">Analyze the complexity of algorithms and apply asymptotic notations.Apply non-linear data structures and their operations.Understand and apply greedy, divide and conquer algorithms.Develop dynamic programming algorithms for various real-time applications.Illustrate Backtracking algorithms for various applications.							
UNIT - I	Introduction to Algorithms					9 Hrs	
Introduction to Algorithms: Algorithms, Pseudocode for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh, Omega, Theta notation and Little oh notation, Polynomial Vs Exponential Algorithms, Average, Best and Worst Case Complexities, Analysing Recursive Programs.							
UNIT - II	Trees Part-I					8 Hrs	
Trees Part-I Binary Search Trees: Definition and Operations, AVL Trees: Definition and Operations, Applications. B Trees: Definition and Operations.							
UNIT - III	Trees Part-II					8 Hrs	
Trees Part-II Red-Black Trees, Splay Trees, Applications. Hash Tables: Introduction, Hash Structure, Hash functions, Linear Open Addressing, Chaining and Applications.							
UNIT - IV	Divide and conquer, Greedy method					9 Hrs	
Divide and conquer: General method, applications-Binary search, Finding Maximum and minimum, Quick sort, Merge sort, Strassen's matrix multiplication. Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.							
UNIT - V	Dynamic Programming & Backtracking					9 Hrs	
Dynamic Programming: General method, applications- 0/1 knapsack problem, All pairs shortest path problem, Travelling salesperson problem, Reliability design. Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles. Introduction to NP-Hard and NP-Complete problems: Basic Concepts.							
Textbooks:							
<ol style="list-style-type: none">Data Structures and algorithms: Concepts, Techniques and Applications, G A V Pai.Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications Pvt. Ltd.							



R 20 Regulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Computer Science & Engineering

Reference Books:
1. Classic Data Structures by D. Samanta, 2005, PHI
2. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
3. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.
Online Learning Resources:
https://www.tutorialspoint.com/advanced_data_structures/index.asp
http://peterindia.net/Algorithms.html