

Krantiguru Shyamji Krishna Verma Kachchh University, Bhuj
Master of Science (Computer Applications & Information Technology)
Semester: II

Paper Code: CCCS205		Total Credit : 4
Title of Paper: Introduction to Data Structure and Algorithm		Total Marks : 70
		Time : 3 Hrs
Unit	Description	Weighting
I	<p>Introduction Variables, Data Types, Data Structures, Abstract Data Types (ADTs) What is an Algorithm? Why the Analysis of Algorithms? Goal of the Analysis of Algorithms, What is Running Time Analysis? How to Compare Algorithms, What is Rate of Growth? Commonly Used Rates of Growth, Types of Analysis, Asymptotic Notation, Big-O Notation, Omega-Ω Notation, Theta-Θ Notation, Why is it called Asymptotic Analysis? Guidelines for Asymptotic Analysis, Properties of Notations, Commonly used Logarithms and Summations, Master Theorem for Divide and Conquer, Divide and Conquer Master Theorem: Problems & Solutions, Master Theorem for Subtract and Conquer Recurrences, Variant of Subtraction and Conquer Master Theorem, Method of Guessing and Confirming, Amortized Analysis Algorithms Analysis: Problems & Solutions</p>	20%
II	<p>Recursion and Backtracking Introduction, What is Recursion? Why Recursion? Format of a Recursive Function, Recursion and Memory (Visualization), Recursion versus Iteration, Notes on Recursion, Example Algorithms of Recursion, Recursion: Problems & Solutions, What is Backtracking? Example Algorithms of Backtracking, Backtracking: Problems & Solutions</p> <p>Linked Lists What is a Linked List? Linked Lists ADT, Why Linked Lists? Arrays Overview, Comparison of Linked Lists with Arrays and Dynamic Arrays, Singly Linked Lists, Doubly Linked Lists, Circular Linked Lists, A Memory-efficient Doubly Linked List, Unrolled Linked Lists Skip Lists, Linked Lists: Problems & Solutions</p>	20%
III	<p>Stacks What is a Stack? How Stacks are Used, Stack ADT, Applications Implementation, Comparison of Implementations, Stacks: Problems & Solutions</p> <p>Queues What is a Queue?, How are Queues Used, Queue ADT, Exceptions Applications, Implementation, Queues: Problems & Solutions</p>	20%
IV	<p>Trees What is a Tree? Glossary, Binary Trees, Types of Binary Trees, Properties of Binary Trees, Binary Tree Traversals, Generic Trees (N-ary Trees), Threaded Binary Tree Traversals (Stack or Queue-less Traversals), Expression Trees, XOR Trees, Binary Search Trees (BSTs), Balanced Binary Search Trees, AVL (Adelson-Velskii and Landis) Trees, Other Variations on Trees</p>	20%
V	<p>Algorithms Design Techniques Introduction, Classification by Implementation Method Classification by Design Method, Other Classifications</p> <p>Greedy Algorithms Introduction, Greedy Strategy, Elements of Greedy Algorithms, Does Greedy Always Work? Advantages and Disadvantages of Greedy Method, Greedy Applications, Understanding Greedy Technique Greedy Algorithms: Problems & Solutions</p> <p>Divide and Conquer Algorithms</p>	20%
Basic Text & Reference Books :-		
1.	Data Structures And Algorithmic Thinking With Python, Narasimha Karumanchi, CareerMonk Publications	
2.	Introduction to Algorithms, Thomas H. Cormen, Prentice-Hall of India	

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I	Q.1 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.1 (B) Medium / Long Questions. (With Internal Option)	08	
II	Q.2 (A) Answer the Following. (Definitions, Blanks, Full Forms, True/False, Match the Following)	06	14
	Q.2 (B) Medium / Long Questions. (With Internal Option)	08	
III	Q.3 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.3 (B) Medium / Long Questions. (With Internal Option)	08	
IV	Q.4 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.4 (B) Medium / Long Questions. (With Internal Option)	08	
V	Q.5 (A) Short / Medium Questions (With Internal Option)	06	14
	Q.5 (B) Medium / Long Questions. (With Internal Option)	08	