

Maulana Abul Kalam Azad University of Technology, West Bengal
(Formerly West Bengal University of Technology)
Syllabus for B. Tech in CSE (Artificial Intelligence & Machine Learning)
 (Applicable from the academic session 2020-2021)

Data Structure & Algorithm
Code: PCC-CS301
Contacts: 3L

Name of the Course:	Data Structure & Algorithm	
Course Code: PCC-CS(DS)301	Semester: III	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		Examination Scheme
Theory: 3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: hrs./week		End Semester Exam :70 Marks
Credit Points:	3	
Objective:		
1	To learn the basics of abstract data types.	
2	To learn the principles of linear and nonlinear data structures.	
3	To build an application using sorting and searching	
Pre-Requisite:		
1	CS 201 (Basic Computation and Principles of C	
2	M101 & M201 (Mathematics), basics of set theory	

Unit	Content	Hrs/Unit	Marks/Unit
1	Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Technique sand their complexity analysis.	10	
2	Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	9	

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3	<p>Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular</p> <p>Linked Lists: all operations their algorithms and the complexity analysis.</p> <p>Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis</p>	10	
4.	<p>Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing. Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.</p>	9	

Text book and Reference books:

1. “Data Structures and Program Design In C”, 2/E by Robert L. Kruse, Bruce P. Leung.
2. “Data Structure & Algorithms Using C”, 5th Ed., Khanna Publishing House (AICTE Recommended – 2018)
3. “Fundamentals of Data Structures of C” by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.
4. “Data Structures in C” by Aaron M. Tenenbaum.
5. “Data Structures” by S. Lipschutz.
6. “Data Structures Using C” by Reema Thareja.
7. “Data Structure Using C”, 2/e by A.K. Rath, A. K. Jagadev.
8. “Introduction to Algorithms” by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein
9. “Data Structures through C” by Yashwant Kanetkar, BPB Publications.
10. “Expert Data Structures with C++” by R.B Patel, Khanna Publishing House

Course Outcomes:

On completion of the course students will be able to

PCC-CS301.1 Differentiate how the choices of data structure & algorithm methods impact the performance of program.

PCC-CS301.2 Solve problems based upon different data structure & also write programs.

PCC-CS301.3 Identify appropriate data structure & algorithmic methods in solving problem.

PCC-CS301.4 Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

PCC-CS301.5 Compare and contrast the benefits of dynamic and static data structures implementations.