Course Code	CSE102
Course Name	Data Structures & Algorithms
Credits	4
Course Offered to	UG - First year
Course Description	This course is aimed at giving students a background in basic data structures and algorithms along with their impact in solving real life problems using a computer. The major focus will be on covering the basic data structures, b) Algorithm analysis using recurrence relations and c) problem solving using Java.

Pre-requisites

Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requiste (Other)
CSE101 Intro to Programming		

*Please insert more rows if required

Post Conditions*(For suggestions on verbs please refer the second sheet)

CO1	CO2	CO3	CO4
Able to write recursive solutions to simple problems. .	Able to compute asymptotic complexity of algorithms and analyze running time of algorithms.	Able to indicate appropriate sorting method for specific situations.	Able to apply basic data structures and algorithms learnt in the course in Java.

Weekly Lecture Plan

Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
Week 1-2-3	1.Introduction to Java,handling arrays,methods,linear search, insertion sort, selection sort and Bubble sort 2.Binary search,Time Complexity, Asymptotic Analysis,Big –Oh notation,Recurrence relation 3. Revision of Recursion:-Fibonacci sequence generation,Tower of Honoi,	CO1, CO2	Weekly programming assignments and homeworks to implement and analyse data structures covered in class. Homeworks contain both theoretical and programming problems.
Week 4-5-6-7	4.• Lists and Implementations:- Linked lists , Recursive functions on lists,Deletion, insertion, reversing, joining,Stacks, Queues using linked lists,handling Polynomials 5. Sorting Algorithms:- Merge and Quick sort,Bucket and radix sort	CO1, CO2, CO3,CO4	
Week 8-9	6. • Tree data structure and Implementations:-binary and complete trees, tree traversals,tree algorithms, Binary search trees, insertion and deletion	CO1, CO2, CO3, CO4	
Week 10-11	7. AVL trees, B-Trees 8. Heap Trees - Priority Queues, heap sort	CO2, CO3, CO4	

Week 12	9.• Hashing:-Chained Hash Tables,Linear Probing, Double Hashing 10. Disjoint Set Class:-Smart Union Algorithms,Path	CO2, CO4	
Week 13	11.• Graph and Direct Acyclic Graph Algorithms:-BFS, DFS,Topological sort,Minimum spanning trees,Huffman coding,Shortest path	CO2,C04	

*Please insert more rows if required

Weekly Lab Plan

Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)
General Plan	Lab assignment consisted of two problems, based on topics covered in previous week		
Week 1	Lab Test based on topics taken up in C Refresher module-pointer and structures	CO1, CO2	Program in Java language-IDE as per choice
Week 2-3	Sorting- two problems with one of them focussing on optimal solution based on time complexity	CO1, CO2, CO4	Program in Java language-IDE as per choice
Week 4	Sorting and Heaps- One direct problem on building a minheap, another problem requiring use of Priority Queue(application of Heap)	CO1, CO2, CO3, CO4	Program in Java language-IDE as per choice
Week 5	Quicksort- Two application problems on Quicksort-one of easy level and another of medium level difficulty	CO1, CO2, CO3, CO4	Program in Java language-IDE as per choice
Week 6	Stacks, Queue- Two problems on Implementation and Application	CO1, CO2, CO4	Program in Java language-IDE as per choice
Week 7	Linked List-Two Problems- One on implementing basic linked list operations, another on implementing intersect and merge operations on two linked lists	CO1, CO2, CO4	Program in Java language-IDE as per choice
Week 8	Binary Search Tree-Implementation of Basic BST operations and extension of deletion operation to delete nodes in a certain range.Additionally a bonus question of difficulty level was given on Trees as a weekend assignment	CO1, CO2, CO4	Program in Java language-IDE as per choice
Week 9	MidTerm Lab Exam- covering topics taken up before midsem	CO1, CO2, CO3, CO4	Program in Java language-IDE as per choice
Week 10	Graph Traversal(BFS,DFS)- Focussing on Practical scenario application of these algorithms	CO1, CO2, CO3, CO4	Program in Java language-IDE as per choice
Week 11	SCC, Topological Sort-Focussing on Practical scenario application of these algorithms	CO1, CO2, CO3, CO4	Program in Java language-IDE as per choice

Week 12	Disjoint Set, Minimum Spanning Tree-Focussing on Practical scenario application of these algorithms	CO1, CO2, CO4	Program in Java language-IDE as per choice
Week 13	A Re-attempt on Problems given in Week 11,12 was allowed to students	CO1, CO2, CO3, CO4	Program in Java language-IDE as per choice

*Please insert more rows if required

Assessment Plan

Type of Evaluation	% Contribution in Grade
Mid-sem	30
End-sem	35
Laboratory	20
Quiz and homeworks	15

*Please insert more row for other type of Evaluation

Resource Material

Type	Title
Textbook	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein: Introduction to Algorithms, MIT press, ISBN 978-0-262-03384-8 (Primary Textbook)
Textbook	Mark Allan Weiss: Data Structures and Algorithm Analysis in C (Second Edition), Addison-Wesley, 1997
Textbook	Cormen et al.: Introduction to Algorithms