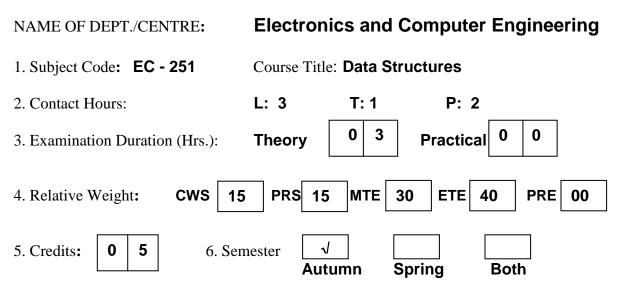
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE



7. Pre-requisite: EC - 101A / EC - 101B

8. Subject Area: DCC

- 9. Objective: To provide basic data structure concepts in an object-oriented setting for design, implementation, testing and maintenance of software systems.
- 10. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	Complexity Analysis: Time and Space complexity of algorithms, asymptotic analysis, big O and other notations, importance of efficient	3
	algorithms, program performance measurement, data structures and algorithms.	
2.	Linear Lists: Abstract data type, sequential and linked representations, comparison of insertion, deletion and search operations for sequential and linked lists, list and chain classes, exception and iterator classes for lists, doubly linked lists, circular lists, linked lists through simulated pointers, lists in STL, skip lists, applications of lists in bin sort, radix sort, sparse tables.	8
3.	Stacks and Queues: Abstract data types, sequential and linked implementations, exception handling in classes, representative applications such as parenthesis matching, towers of Hanoi, wire routing in a circuit, finding path in a maze, simulation of queuing systems, equivalence problem.	6
4.	Hashing: Search efficiency in lists and skip lists, hashing as a search structure, hash table, collision avoidance, linear open addressing, chains, uses of hash tables in text compression, LZW algorithm.	4
5.	Trees: Binary trees and their properties, terminology, sequential and linked implementations, tree traversal methods and algorithms, heaps as priority queues, heap implementation, insertion and deletion operations,	8

	heapsort, heaps in Huffman coding, leftist trees, tournament trees, use of winner trees in mergesort as an external sorting algorithm, bin packing.	
6.	Search Trees : Binary search trees, search efficiency, insertion and deletion operations, importance of balancing, AVL trees, searching insertion and deletions in AVL trees, red-black trees, comparison with AVL trees, search insert and delete operations.	4
7.	Multiway Trees: Issues in large dictionaries, m-way search trees, B-trees, search insert and delete operations, height of B-tree, 2-3 trees, sets and multisets in STL.	5
8.	Graphs: Definition, terminology, directed and undirected graphs, properties, connectivity in graphs, applications, implementation – adjacency matrix and linked adjacency chains, graph traversal – breadth first and depth first, spanning trees.	4
	Total	42
	Laboratory component (a) Programming of various data structures and applications in C++ and Java. (b) Data structure programming using STL. 	14x2

11. Suggested Books:

Sl.	Name of Books / Authors	Year of
No.		Publication
1.	Sahni, S., "Data Structures, Algorithms, and Applications in C++",	2001
	WCB/McGraw-Hill.	
2.	Sahni, S., "Data Structures, Algorithms, and Applications in Java",	2001
	WCB/McGraw-Hill.	
3.	Drozdek, A., "Data Structures and Algorithms in C++", Vikas Publishing	2002
	House.	
4.	Wirth, N., "Algorithms and Data Structures", Prentice-Hall of India.	1985
5.	Lafore, R., "Data Structures and Algorithms in Java", 2 nd Ed., Dorling	2007
	Kindersley.	