DATA STRUCTURES AND ALGORITHMS
(CS-250)

Contact Hours			Credit Hours		
Theory	=	54	Theory	=	3
Practical	=	54	Practical	=	1
Total	=	108	Total	=	4

Course Objectives

The course is designed to teach students the schemes and structures for storing data efficiently and then devising efficient programs that manipulate those structures. The students are trained extensively to differentiate existing data structures and choosing right one for a specific application. The students are exposed to the concepts of space and time complexity, enabling them to design fast algorithms. The students are taught the skills for doing analysis of algorithms and theory of NP complete and NP hard problems and the heuristics.

Course Outcomes

Students are expected to have a strong understanding of data structures and their implementation, and design and analysis of algorithms.

Course outline

PART-I ABSTRACT DATA TYPES

1. Arrays
2. Dynamic memory allocation
3. Implementation of stacks
4. Implementation of Queues & priority Queues
5. Linked lists (single, double, circular)

PART-II TREES

6. Binary Trees
7. N-Trees
8. Implementation of Searching Algorithms

PART-III ALGORITHMS

9. Calculating the complexity of algorithms
10. Improving the efficiency of algorithms
11. Sorting Algorithms
12. Searching Algorithms

PART-IV ADVANCED TOPICS

13.   Vectors
14.   Roles and Implementation of trees in databases
15.   indexing

Text Book

Data Structures and Algorithms (Paperback) by Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Publisher: Pearson

Reference Books

a.   Introduction to Algorithms, second edition by T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, The MIT Press.
b.   Data structures and algorithms by Lafore, (SAMS teach yourself), Sams Publishing.
c.   Kathy Sierra and Bert Bates, Head First Java, O'Reilly, 2005. ISBN # 0-596-00920-8.
d.   Michael T. Goodrich and Roberto Tamassia, Data Structures and Algorithms in Java, John Wiley & Sons, 2006.
e.   Algorithm Design by Jon Kleinberg and Éva Tardos