Course: 304 : Data Structures

Course Code	304
Course Title	Data Structures
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	June 2015
Purpose of Course	1. Computing systems are concerned with the storage and retrieval of information. 2. For systems to be economical the data must be organized (into data structures) in such a way as to support efficient manipulation (by algorithms). 3. Choosing the wrong algorithms and data structures makes a program slow at best and difficult to maintain and insecure at worst.
Course Objective	1. Get the detailed knowledge of basic data structures, role and importance of data structures in computer programming. 2. Distinguish the key difference between various data structures. 3. Recognize the problem properties and determine the use of appropriate data structures in different real world applications.
Pre-requisite	This course requires 1. Problem-solving, design and implementation skills. 2. Basic knowledge of programming language.
Course outcome	Students will be able to 1. Implement various operations of data structures and utilities using algorithm. 2. Select appropriate methods for organizing data files and implement file-based data structures.
Course Content	**Unit 1.** Introduction to data structures 1.1 Definition 1.2 Types of data structure 1.2.1 Primitive Data Structures 1.2.2 Non-primitive Data Structure (linear and non-linear) 1.3 Storage representation of primitive data structure (integer and character) **Unit 2.** Non-primitive linear Data structures 2.1 Arrays – its storage structures and Operations (insertion and deletion) 2.2 Stack 2.2.1 Stack operations 2.2.2 Applications of Stack (Recursion and Polish notations) 2.3 Queue 2.3.1 Types of Queues (Simple, Circular, Double-ended and Priority) 2.3.2 Operations on Queue 2.3.3 Application of Queue (Simulation) 2.4 Linked list 2.4.1 Types of Linked lists (Singly, Doubly, Circular)

	2.4.2 Operations on Linked list 2.4.3 Applications of Linked list (Polynomial manipulation) **Unit 3.** Non-primitive non-linear Data structures 3.1 Definition of Graph 3.2 Concept and Definition of Tree 3.3 Types of Binary Tree (Ordinary/Simple, Strictly and Complete Binary tree) 3.4 Operations on Binary tree (Traversals, Insertion and Deletion) 3.5 Storage representation of Binary tree (Linked, Sequential and Threaded) 3.6 Binary search tree 3.7 Application of tree (Manipulation of arithmetic expression) **Unit 4.** Sorting Techniques 4.1 Introduction 4.2 Types of Sorting (Insertion, Selection, Quick, 2-Way Merge and Bubble) **Unit 5.** Search Techniques and Balance trees 5.1 Introduction 5.2 Searching (Sequential and Binary) 5.3 Balance trees 5.3.1 AVL tree 5.3.2 2-3 tree
Reference Books	1. An introduction to Data Structures with applications, Trembley – Tata McGraw Hill. 2. Algorithms – Data structure programs, Wirth Niclaus - PHI. 3. Data structures – A Programming Approach with C, Dharmender Singh Kushwaha and Arun Kumar Misra – PHI. 4. Fundamentals of Data structures, Horwitz E. and Sahni – Computer Science Press 5. Schaum's outline of Data Structure with C++, John R. H. - Tata McGraw Hill. 6. Expert Data Structure with C, R. B. Patel - Khanna Publication 7. Data structures - a Pseudocode approach with C++, Richard F. Gilberg and Behrouz A. Forouzan - Thomson books
Teaching Methodology	Class Work, Discussion, Self Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.