DATA STRUCTURE AND COMPUTER PROGRAMMING

Paper Code	**ECS-405**
Course Credits	4
Lectures/ Week	3
Tutorials/ Week	1

Course description

UNIT- IBASICS OF DATA STRUCTURE AND ALGORITHMS

Difference between data structure and data type, built in data structure i.e. array and user defined data structure, i.e. stack, queue, etc. **Array:** Representation of an array, types of array, i.e. One-dimensional array, two-dimensional array, Three-Dimensional array and n-dimensional arrays, row and column major implementation of different types of array. **Algorithm:** Time and space complexity of algorithm; asymptotic notation: Big oh notation, etc. **Sorting Algorithm:** Bubble sort, selection sort, Insertion sort, Merge sort and Quick Sort. **Searching Algorithm:** Linear search and binary search.

UNIT- II STACKED QUEUE &LINKED LIST

Stack: Introduction: Push and Pop Operation, Array implementation of stack; application of stack: evaluation of a postfix, conversion of an expression from infix to postfix, recursion and tower of Hanoi problem; **Queue:** Introduction, operation on queue, i.e. insertion and deletion, full and empty types of queue: linear queue, circular queue, priority queue and doubly ended queue, queue implementation. **Linked List:** Concept of linked list, inserting and removing notes from the linked list, types of linked list, single and double linked list, implementation of stack and queue using linked list.

UNIT- III TREES AND GRAPHS

Trees: Concepts of a tree, binary trees, strictly binary trees, complete binary trees, almost complete binary trees, height and depth of a tree, operation on tree, array and linked representation

of binary trees, tree search algorithm, binary search trees (BST), tree traversal algorithms: in-order, preorder & post-order.

UNIT-IV BASICS OF C++

Beginning with C++, constants, variables, operators, expressions, control structures, loops, arrays and pointers, functions: functions prototypes, call by value, call by reference, inline functions, function overloading.

Class and Objects: specifying a class, program based on classes and objects

UNIT-V ADVANCED C++

Constructors and destructors, multiple constructors in a class, dynamic constructors and destructors, operators overloading: rules for operator overloading, overloading unary and binary operators, polymorphism and related programs

Pre-requisite Fundamentals of Computing

Course/Paper:

Text Book/

Reference Book:

1.Seymour Lipschutz, “Theory and Problems of Data Structures” Tata McGraw-Hill Book Company Ltd.

2. Seymour Lipschutz, “Data Structure with C”, Shaum’s Outline series.

3. DebasisSamanta, “Classic Data Structure”, Prentice Hall of India Pvt. Ltd.

4. Balagurusami, E, “Object Oriented Programming in C++”, Tata McGraw-Hill Book Company Ltd.

5. Herbert Schildt, “C++: The Complete Reference”, Tata McGraw-Hill Publishing Company Ltd.

6. Denitel, H. M. &Deltel, P.J., “C++: How to program”, Prentice Hall of India Pvt. Ltd.

Course Outcome:

CO1: To understand the properties of various data structures&Possess the knowledge of various existing algorithms.

CO2: To understand the use of linear and non-linear data structures like stacks, queues & linked lists.

CO3: To apply algorithms and use of trees and graphs as tools to visualize and simplify the problems.

CO4: To understand & create programs in C++ using sound OOP practices and proper program structuring.

CO5: Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading

Computer usage/

Software required: Turbo C++ 3.0