VNR Vignana Jyothi Institute of Engineering & Technology

II Year B.Tech CSE- I Sem	**L**	**T/P/D**	**C**
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(5IT03) ADVANCED DATA STRUCTURES THROUGH C++
(Common to CSE and IT)

Course Objectives:

- **Declaration** and use of various data types and data structures.
- **Understand** applicability for the various data structures and the concept of logic encapsulation.
- To **design** and code algorithms for solutions and to implement algorithms into programming code.
- **Demonstrate** data structure problem solutions, search and retrieval of information.

Course Outcomes:
After completion of the course the student is able to

- **Design** Applications Using Object Oriented Features.
- **Understand** the difference between worst, best, and average case run time of a method.
- **Apply** the knowledge of Advanced Data Structures in computer science applications.
- **Select** the appropriate data structure for a given situation.

UNIT - I
Different strategies for problem solving need for OOP, Overview of OOP Principles-Encapsulation, Inheritance, and Polymorphism. C++ class overview-class definition, objects, class members, access control, class scope, constructors and destructors, inline functions, static class members, this pointer, friend functions, dynamic memory allocation and de allocation (new and delete).

UNIT - II
Polymorphism and Inheritance: Function overloading, operator overloading, generic programming-Function and class templates, inheritance basics, base and derived classes, different types of inheritance, base class access control, virtual base class, function overriding, run time polymorphism using virtual functions, exception handling mechanism, abstract classes.

UNIT – III
Performance Analysis: Introduction to Time complexity and space complexity of Algorithms, Big O, Omega and Theta notations-Only Basic Level, Review of basic data structures. Implementation of List ADT , Stack ADT , Queue ADT using template classes, Priority Queue-Definition, ADT, Operations-Insertion, Deletion, Heap-Definition, Max Heap and Min Heap ,Insertion and deletion, Heap Sort.

UNIT - IV

Dictionaries-Definition, ADT, Linear List representation, operations- insertion, deletion and searching, Hash Table representation, Hash function-Division Method, Collision, Collision Resolution Techniques-Separate Chaining, open addressing-linear probing, quadratic probing, double hashing, Rehashing.

UNIT - V

Search trees: Binary search trees, definition, ADT, implementation, operations-searching, insertion and deletion, Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion, deletion and searching. Search trees B-Trees-B-Tree of order m, height of a B-Tree, insertion, deletion and searching.

TEXT BOOKS:

1. Mastering C++ by K.R.Venugopal , RajKumar and T.Ravishankar , TATA McGrawHill.(Unit-I,Unit-II)
2. Data structures, Algorithms and Applications in C++,S.Sahni, University press (India) pvt ltd, 2nd edition, Orient Longman pvt.ltd. (Unit-III,Unit-IV)
3. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education , Second edition. (Unit-III,Unit-IV,Unit-V)

REFERENCES:

1. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI/Pearson Education.
2. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
3. Data Structures and Algorithms in C++, Second Edition, Adam Drozdek, Vikas Publishing House, Thomson International Student Edition.
4. The C++ Programming Language B. Stroustrup, 3rd edition Pearson Education.