| 18CSOE07 | DATA STRUCTURES USING C++ | L | T | P | C |
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**Course Objectives:**

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| 1. | To comprehend the fundamentals of object oriented programming, particularly in C++ |
| 2. | To use object oriented programming to implement data structures |
| 3. | To introduce linear, non-linear data structures and their applications |

| UNIT I | DATA ABSTRACTION & OVERLOADING | 9 | + | 0 |
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Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Overloading: Function overloading and Operator Overloading.

| UNIT II | INHERITANCE AND POLYMORPHISM | 9 | + | 0 |
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Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object to Base – Class Object Conversion – Virtual functions – this Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding

| UNIT III | LINEAR DATA STRUCTURES | 9 | + | 0 |
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Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists –Polynomial Manipulation – Stack ADT – Queue ADT – Evaluating arithmetic expressions.

| UNIT IV | NON-LINEAR DATA STRUCTURES | 9 | + | 0 |
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Trees – Binary Trees – Binary tree representation and traversals – Application of trees – Binary Search Tree - Heaps - Operations of Heaps - Binary Heap - Max Heap - Min Heap - Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth-first search.

| UNIT V | SORTING AND SEARCHING | 9 | + | 0 |
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Sorting algorithms: Insertion sort – Quick sort – Merge sort – Searching: Linear search –Binary Search

**Total (L+T)= 45 Periods**

**Course Outcomes:**

Upon completion of this course, the students will be able to:

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| CO1 | : | Explain the concepts of Object oriented programming |

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| CO2 | : | Write simple applications using C++. |
| CO3 | : | Discuss the different methods of organizing large amount of data. |

**Text Books:**

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| 1. | Deitel and Deitel, "C++, How To Program", Fifth Edition, Pearson Education, 2005 (Unit I & II) |
| 2. | Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison Wesley, 2007- (Unit – III,IV &V) |

**Reference Books:**

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|---|---|
| 1. | Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010. |
| 2. | Goodrich, Michael T., Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley. 2004. |
| 3. | Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002. |
| 4. | Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007. |
| 5. | Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, "Fundamentals of Data Structures in C++", Galgotia Publications, 2007. |