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SUBJECT: OBJECT ORIENTED PROGRAMMING LAB (OOPL)

ASSIGNMENT NO: C-6 :-

QUESTIONS:-

Q1) What is STL and what are the components of it? Explain them.

ANS. 'STL' stands for 'standard Template Library.' The STL i.e. standard Template Library is a set of C++ template classes to provide common programming data structures and functions such as Files, stacks, array., etc.

- It is a library of container classes, Algorithms and iterators. It is a generalized Library and so, its components are parameterized.

STL can be used to simplyfy the development of C++ programs.

- It provides a range of containers such as vectors, lists and maps as well as algorithms for searching, sorting and Manipulating data.

⇒ The key Components of STL are:-

(1.) Container:-
- The STL provides a range of containers, such as vectors, list, map, set and stack which can be used to store and manipulate data.

(2.) Algorithms:
- The STL Provides a range of Algorithms such as sort, find, and binary_search, which can be used to manipulate data stored in containers.

(3.) Iterators:-

- Iterators are objects that provide a way to traverse the elements of a container. The STL provides a range of iterators, such as forword-iterator, bidirectional-iterator and random_access_iterator that can be used with different types of container.

(4.) Functions/ Function Objects.

- Functors are objects that can be used as Function arguments to algorithms. They provide a way to pass a Function to an algorithm, allowing you to customize its behaviour.

(5.) Adapters:-

- Adapters are components that modify the behaviour of other components in STL. For Eg:- The reverse iterator adapter can be used to reverse the order of elements in a container.

Q2.] What is Sequence Container and Explain the list & Vector in detail with its Functions.

ANS. In C++, Sequence container are used to store the elements in a particular order. They provide efficient random access to elements and allow the insertion and deletion of elements at any position. Sequence containers in C++ are defined in the header file.

For Example:-

```
#include <vector>  // This allows you to use vectors in the program.
```

Sequence containers can store various data types, such as integers, characters, strings and user defined data types They are implemented as dynamic arrays, linked lists These containers provide several Functions to manipulate the element, such as inserting, deleting, and accessing elements.

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- List:-

List are sequence containers that allow non-contagious memory allocation. As compared to the vector, the list has slow traversal, but once a position has been found, insertion and deletion are quick (constant time). Normally when we say a list we talk about a doubly linked list.
std::list is the class of the list container.
Head File of list is defined as
#include <list>
Syntax for declaring a list:
std::list <type> list_name = { val1, val2, ... , valn }

Functions of List are:-

(1.) Front(): Returns the value of the first element in the list.
(2.) back(): Returns the value of the last element in the list.
(3.) push_front(g) - Adds a new element 'g' at the beginning of list.
(4.) push_back(g) - Adds a new element 'g' at the end of the list.
(5.) pop_front(), pop_back() – Removes the element from the front, Removes the element from end respectively.
(6.) list::begin() – Returns a iterator pointing to the first element
(7.) list::end() – Returns a iterator pointing to the last element

– Vectors:-

Vectors are the same like dynamic arrays with the ability to resize itself automatically when an element is inserted or deleted, with their storage being handled automatically by the container. Vector elements are placed in contiguous memory storage so that they can be accessed using iterators. In vector inserting data at the end can take differential time as sometimes array may need to be extended. Removing the last elements takes only constant time because no resizing happens.
• Syntax to Declare Vector:-

std::vector <T> vector_name;

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Functions of Vectors are:-

i) begin() : Returns iterator pointing to first element
ii) end() : Returns iterator pointing to last element.
iii) size() : Get size.
iv) resize() : Changes the size.
v) front() : Returns the first element.
vi) back() : Returns the last element.
vii) insert() : Used to insert a element.
viii) swap() : Swap contents.