

CS-201 FINAL TERM NOTES (THEORETICALLY)

Lecture No 23

1. Pre-processor:

Old: #include <iostream.h>

New: #include <iostream>

2. Include Directive:

It is written as:

```
#include "myHeaderfile.h"
```

3. Define Directive:

Also called Macros.

Macros is a special name, which is substituted in the code by its definition and, as a result we get an expand code.

With the define directive , we can define PI as:

```
#define Pi 3.1415926
```

Jab macros ko use Kiya jata hai to is mein assignment operator Nahin lagaya jata,, without Assignment operator, value assign ki jati hai

4. Pre-processor directives (Mcqs)

- `#include <filename>`
- `#include "filename"`
- `#define`
- `#undef`
- `#ifdef`
- `#ifndef`
- `#if`
- `#else`
- `#elif`
- `#endif`
- `#error`
- `#line`
- `#pragma`
- `#assert`

5. Macros:

Macros are classified into two categories.

First: The first type of macros can be written using `#define`. The value of PI can be defined as:

```
#define Pi 3.1415926
```

Second: The second type of macros takes arguments. It is also called a "*parameterized macros*".

Consider the following:

```
#define square (x) x*x
```

Correct definition of the macros will be:

```
#define square (x) ((x)*(x))
```

Lecture No 24

1. Memory Allocation:

Memory will be allocated during the execution of program.

There are two types of memory

1. Static
2. Dynamic

Static: Static Allocation is also called “*Compile time allocation*”.

This memory allocation is defined at the time when we write the program while exactly knowing how much memory is required.

Static memory stored in “Stack”.

Dynamic: Whenever we don't know in advance how much memory space would be required, it is better to use dynamic memory allocation.

Dynamic memory stored in “heap”.

2. Void Pointer:

Jab b ap void pointer ko use Karen gy to sab say pehly apko uski “casting” krni pryge....

Casting: Cast means the conversion of “void” into a type of pointer that can be used for native data type like int, char, float etc.....

For example:

Void *ptr

(int*) ptr

It is an error to try to use the void pointer and dereference it.

Note: Aik pointer ki by default value “NULL” Hoti hai. NULL value ko use Krny k liye apko 2 header files ki zarurat parti hai.....

1. Stdlib.h
2. Stddef.h

Zero value is an invalid memory address.

3. Difference b/w Malloc, Calloc & Realloc Function :

Malloc(): Malloc() function is used to allocate a block of memory dynamically.

Calloc(): Calloc() is a function which is used to allocate multiple blocks of memory.

Realloc(): Realloc() is a function which is used to resize the memory block which is allocated in Malloc() or Calloc() before.

Memory leak: Memory leakage occurs in C++, when programmers allocates memory by using “new” keyword and forgets to deallocate the memory by using “delete()” function or “delete[]” operator.

One of the most memory leakage occurs in C++ by using wrong delete operator.

Lecture No 25

1. Top-down Structured Programming:

A top-down approach is a programming methodology that involves starting with an overview of the problem, breaking it down into

smaller sub-problems, and then gradually building the solution by implementing each sub-problem in a hierarchical manner.

Top-down structured programming also called “Divide & Conquer”.

2. Single Entry Single Exit:

This technique only used inside the function ,, not outside.

Arguments & parameters are Sane thing,, don't confuse.

3. Local & Global Variables:

Local Variables: inside the braces, the variables are called “Local Variables”

Global Variables: Outside the braces, the variables are called “Global Variables”.

4. Inline Function:

When the function called compiler needs some extra time to execute it.

But if our function is small and we are just doing common addition or multiplication in function. Then we can make that function inline by just adding “inline” keyword in front of the function.

Disadvantages of Inline Function:

- The inline function may not work is a function returning values, if a loop switch or a GOTO statement exists.
If function contains static variables & if function is recursive.

5. Function Overloading:

C++ lets you specify more than one function of the same name in the same scope. These functions are called overloaded functions, or overloads.

The following statement stand for:

((A)>(B)?(A)(B))

If A greater than B then output A.

Means:

- > (Greater than)
- ? (Then)
- : (Output)

Lecture No 26

Class Structure:

```
class student
{

};
```

Note: Classes banty huye ap (class keyword) k liye small letters use Karen gy.....

Classes mein sirf 2 cheezen use Hoti hen, these are following:

- *Variables*
- *Functions*

There are three types of Access Modifiers used in Classes:

- **Public**
- **Private**
- **Protected**

Note:

- *Function (Classes) Ko “main function” k bahir bnaya jaega or phr “main function” k andr us function Ko call Kiya jata hai....*
- *Har class Ka aik object laazmii hota h ,, wo koi b letter ho Sakta hai....*
- *Object k sath (.) Dot operator lga Kar Kisi b Class function Ko call Kiya jata hai*

Lecture No 27

Difference between Constructor & Destructor:

Constructor: Constructor is called by the compiler whenever the object of the class is created, it allocates the memory to the object and initializes class data members.

Destructor: A destructor is called by the compiler when the object is destroyed and its main function is to deallocate the memory of the object

Types of Constructor:

- **Default Constructor**
- **Parameterized Constructor**

- Copy Constructor

Utility Function: utility is a header file in the C++ Standard Library. This file has two key components: rel_ops , a namespace containing set of templates which define default behavior for the relational operators != , > , <= , and >= between objects of the same type, based on user-defined operators == and < .

Lecture No 28

How can we access data members inside the Structure?

Answer: By using (.) Dot operator.

Note: Agr Classes mein “pointer” use Kiya Jaye then us k data members ko Access krny k liye (->) “Arrow operator” use Kiya jata hai

What is “heap” and “Free Store” in C & C++?

Answer:

- In C, the region of memory allocated at runtime is called “heap”.
- In C++, the region of available memory is ed “Free Store”.

New Operator:

Whenever “new operator” is used to create an object.

Following actions performed:

- It automatically determines the size of the memory required to store that object, leaving no need of the use of “sizeof” operator.
- Calls the constructor of the class, where the programmers normally write initialization code.
- Returns pointer of the class type that means no casting is required.

Difference between Classes & Structure:

Structure: is declared with the “Struct” keyword.

Structure k andr use Kiya gya modifier by default “Public” hota hai

Classes: is declared with “class” keyword.

Class k andr use Kiya gya modifier by default “Private” hota hai....

Note: *Constructor ki memory ko delete krny k liye destructor use hota hai lekin.....*

Jab ap “malloc()” yaa phr “New” operator k sath memory bnaen gy to usay khtam krny k liye “free()” yaa “delete” operators use hongy.....

Lecture No 29

Friend Function:

A friend function is a function that isn't a member of a class but has access to the class's private and protected members.

Friend Classes:

A Friend class in C++ can access the private and protected members of the class in which it is declared as a friend.

Lecture No 30

Reference Data type:

A reference, like a pointer, stores the address of an object that is located elsewhere in memory.

Difference between Reference & Pointer:

A reference variable provides a new name to an existing variable. It is dereferenced implicitly and does not need the dereferencing operator * to retrieve the value referenced. On the other hand, a pointer variable stores an address. You can change the address value stored in a pointer.

Dangling Reference:

Dangling reference happens when we are referring to an object or variable where it is de-allocated.

Ab is k baad ap nay Lec No 34 Start krna hai qn k from Lec 31 to 33,, previous concepts hee discuss kiye Gaye hen....

Lecture No 34

Array of code:

C++ arrays allow a programmer to store multiple elements of the same data type in a single structure.

Note: *New* is called before the constructor and *delete* is called after the destructor. A Global array called **Pool** than can store all the name objects expected.

Lecture No 35

C++ Class: is a collection of data and the methods necessary to control and maintain that data.

C++ Stream: is a flow of data into or out of a program , such as the data written to cout and read from cin.

Istream: is a general purpose input stream. Cin is an example of istream.

ostream : is a general purpose output stream. Cout and cerr are both examples of ostream.

Ifstream: is an input file stream. It is a special kind of an istream that reads in data from a data file.

Ofstream: is an output file stream. It is a special kind of ostream that writes data out to a data file.

MCQs

- **eofbit** is set to true when an attempt is made to read past the end of the file.
- **badbit** is set when corrupted data is read,, for example when the type of data in the file does not match the type being read.
- **failbit** is set when a file fails to open or when the end of the file is read or when corrupted data is read.
- **goodbit** is set to true whenever the other three bits are all false,, and is false otherwise.

The following methods are used to check & reset the bits:

- **eof()**_____ returns the state of the eof bit.
- **bad()**_____ returns the state of the bad bit.
- **fail()**_____ returns the state of the fail bit.
- **good()**_____ returns the state of the good bit.
- **clear()**_____ sets the good bit to true and all other to false.

Lecture No 36

Manipulators:

- Manipulators a special functions that can be included in the I/O statement to alter the format parameters of a stream.

- Manipulators are operators that are used to format the data display.
- To access manipulators, the file `iomanip.h` should be included in the program.

Types of Manipulators in C++

They are of two types, one taking arguments and other without arguments.

Non-arguments manipulators are called “Parameterized Manipulators”. These manipulators required `iomanip` header. For example, `setprecision`, `setw` and `setfill`.

Baqi almost previous concepts hee discuss kiye jaa rhy hen next lecs mein ,, that's why..... Next ham Lec No 40 start karengy!

Lecture No 41

Templates:

Templates in C++ is defined as a blueprint or formula for creating a generic class or a function. To simply put, you can create a single function or single class to work with different data types using templates.

C++ template is known as generic functions or classes which is a very powerful feature in C++.

Lecture No 42

Advantages of Templates:

- Templates help us avoid writing repetitive code.
- Templates foster the creation of generic libraries providing algorithms and types, such as the standard C++ library (sometimes incorrectly referred to as the STL), which can be used in many applications, regardless of their type.

Disadvantages of Templates:

- Supported features
- compiler support
- poor error messages
- code bloat

Lecture No 43

Matrix:

A matrix is a rectangular array of numbers that is arranged in the form of rows and columns.

An example of a matrix is as follows.

A 3*2 matrix has 3 rows and 2 columns.

Lecture No 44

Matrix Constructor:

A constructor that takes as parameters number of rows m and columns n of the matrix.

Transpose of Matrix:

It means to replace the number of rows with number of columns and vice versa to make a new matrix.

Remember me in your

prayers..... 