First 1 Hour -> C++ Introduction and Overview

1. Basic Terminologies

a) Editor

A place where we write our code like turbo c++, code: blocks, Online compliers

b) Program

It has 2 meanings 1. EXE file

2. set of instruction.

c) Source code

A instruction which we write in our editors

d) Machine Code

Code after compilation

e) Compiler

Software that compile code and convert into byte code/machine code

f) Interpreter

It interprets the code line by line python

g) Assembler

It is complier for the assembly language.

h) Loader

It loads the byte code in the RAM

i) Tokens

Anything which we write in our Program.

j) Operands

Variables with the operators like a++, a+b

k) Identifier

Variables names, function names

l)Keywords

Reserved words (32) like auto, if, else, switch, break.... etc

m)Constants

It values never changes like 5 ,433,'binod','v',8.909

n) Special symbols

{} () ; , " " ' ' & * <>

o) Comments

To understand our code easily

1. //Single line comment

2. /*This is a

multiline comments*/

2.WHY C++?

https://www.geeksforgeeks.org/top-10-reasons-to-learn-c-plus-plus/

3.History of C++.

https://www.javatpoint.com/cpp-history

4.Application of C++.

https://www.softwaretestinghelp.com/cpp-applications/

5.Structure of the C++ Program.

In Code: Blocks

6.First C++ Program (Hello World), Master Library

7.Data-Types and its Size, Range.

https://www.geeksforgeeks.org/c-data-types/

8.Operators and its Types.

https://www.w3schools.com/cpp/cpp_operators.asp

QPP

1. Sum of 2 Number

2. Simple Interest

9.Decision Making Statements.

https://www.studytonight.com/cpp/decision-making-in-cpp.php

QPP

a) Check Even Number

b) Check Negative Number

c)Check Eligibility

10.Loops and its types.

https://www.w3schools.com/cpp/cpp_while_loop.asp

QPP

a) Factorial of a Number

b) Print Even Number in Range

c)Reverse of a Number

d)Check Palindrome or not.

e) Check Armstrong or not.

11.Scope of the variables.

It defines the lifetime of the variables

1.Local -> Inside the block only.

2.Global -> Anywhere in the Program

***Priority of the local >>>> Priority of Global

https://www.geeksforgeeks.org/scope-of-variables-in-c/#:~:text=In%20general%2C%20the%20scope%20is,Local%20Variables

13. Switch, Break and Exit statements

Switch -> To switch any variables as per the user input.

Break -> It will take you out from loop or any if-else statements

Exit () -> It will take you out from function.

14. Macros

It is a constant which is defined at the top of the program.

It just searches and replace the its value in entire program.

Semicolon not used here.

eg: #define PI 3.14

Quiz

1. Can we make a program without using main () function?

2. Can we make a program without using semicolon(;)?

3. Can we call any user-defined function before Main ()?

Concepts like Array Functions and its Types

1. Array and its types.

It is collection of same type of elements

a)1-D array -> like a[5]={1,2,3,4,5}

b)Multi D array ->

```
int a[3][4] = {
                    {0, 1, 2, 3},   /*  initializers for row indexed by 0 */
                    {4, 5, 6, 7} ,   /*  initializers for row indexed by 1 */
                    {8, 9, 10, 11}   /* initializers for row indexed by 2 */
                };
```

https://www.geeksforgeeks.org/arrays-in-c-cpp/

QPP

a) Sum of array Element.

b) largest of array element.

c) Smallest of array element.

d) Multiply of 2-D array elements

2. Vector in C++(concept of STL)

It is type of STL which is widely used in CP.

https://www.javatpoint.com/cpp-vector

3.Importance of CP

To build the problem solving skills

Site like : Hackerank,Codeforces,Codechef,HackerEarth,SPOJ,leetcode.

4. Array vs Vector.

Vector is much more efficient than array due its flexibility of the size.

5. How to access Vector

Using for each loop

```
#include<vector>
using namespace std;
int main()
{
   vector <int> v;
   v.push_back(1);
    v.push_back(2);
      v.push_back(3);
        v.push_back(4);
         v.push_back(5);

      for(auto x :v)// x is the element of the vector.
      cout<<x<<" ";
return 0;
}
```

6. Function and its Types

a)Declaration,Definition,Calling

b)Pre defined functions

It is a inbuilt function of c++;

eg: pow,sqrt.

c)User defined functions

A function is defined by user.

eg: void sum();

int mul(int a,int b);

d)Recursive functions

1.When a function call itself is called Recursive function.

2.There is must be a base test case where our program terminate.

3.Widely used in the Dynamic Programming of Data Structure.

e)Inline Functions

1.It is one of the best feature of the C++

2.It reduces the function overhead.

3.It reduces the time of Execution

4.It makes our code more efficient.

5.It depends upon the compiler choice.

inline void sum()

```
{
   add = a+b;
   cout << "Addition of two numbers: " <<add;
}
```

7.Parameters and its types

a)Actual -> Varibale in calling function.

b)Formal -> Variables in Definition function.

QPP

a) Sum of two number using function.

b) Sum of N natural Number using function.

8.String in C++.

Set of characters is called string.

eg: 'Rashi' ,"SSR\0"

getline(cin,string name)function is used to read string from console.

https://www.geeksforgeeks.org/stdstring-class-in-c/#:~:text=C%2B%2B%20has%20in%20its%20definition,access%20to%20single%20byte%20character.

9.Pointer in C++.

It is variables which stores address of another variables.

It must be intialized.

https://www.tutorialspoint.com/cplusplus/cpp_pointers.htm

3.Reference in C++.

https://www.tutorialspoint.com/cplusplus/cpp_references.htm

10.Pointer vs References.

https://www.educba.com/c-plus-plus-reference-vs-pointer/

11.Call by value.

only value will be passed

12.Call by Reference.

address will be passed

13.Storage Class.

https://www.geeksforgeeks.org/storage-classes-in-c-with-examples/

14.Namespaces.

It is very useful when we work in a big project.

It helps to avoid name collison.

https://www.studytonight.com/cpp/namespace-in-cpp.php

15.Error and its types.

a)Syntax Error -> Missing semicolon , Main()

b)Semantic Error ->100=a

c)Logical Error -> Error by Programmer

d)Runtime Error -> number/0 , ArrayOutOFBound

16.Exception Handling in C++.

It handles the runtime error.

It use try,catch,Throw blocks.

Try -> code which maycauses error.

Catch -> It handles the error.

Throw -> It throw the exception to the handler.

https://www.studytonight.com/cpp/exception-handling-in-cpp.php

17.Dynamic Memory Allocations.

Memory Allocated at the Run time.

18.New and Delete operators.

DMA achived by these operators.

19.Structure in C++.

It is used to store bulk data like

Students records,Marksheets,Employee Records.

https://www.programiz.com/cpp-programming/structure#:~:text=The%20struct%20keyword%20defines%20a,int%20age%3B%20float%20salary%3B%20%7D%3B

20.Type Casting

It is used to convert the one data type to another.

Try convert lower data type to Upper otherwise there

might cause of data lost.

int a=10,b=20;

double z= double(x/y); //C style type-cast

static_cast <double>(x/y);//C++ style type-cast

Deep Concepts of Oops like Polymorphism ,Abstract class, virtual function

1.POP vs OOPS

https://www.geeksforgeeks.org/difference-between-oop-and-pop/

2. Pillars of the OOPs

a)Inheritance and its types.

https://www.javatpoint.com/cpp-inheritance#:~:text=In%20C%2B%2B%2C%20inheritance%20is,of%20its%20parent%20object%20automatically.&text=In%20C%2B%2B%2C%20the%20class,inherited%20is%20called%20base%20class.

b)Polymorphism

https://beginnersbook.com/2017/08/cpp-polymorphism/

c)Data-Abstraction.

Only relevent data is shown to user like GUI interface of any application.

d)Encapsulation

Wrapping of data and code in a single unit,it is achieved by the object.

3.Classes and Objects

Class is a blueprint or description through which we can create a instance

Objects are the instances of the class type.

4.Access specifier in oops

Public -> Accessible to anywhere.

Private -> Inside the class only.

Protected -> Only take part in the Inheritance.

5.How to declare and define the Class and objects.

```
class X
{
        private:
                int a,int b;//Data member

        public:
                        void sum();//Member function or Methods
                        void dp();
                        void sub();
};
```

QPP

1.Area of square using class

2.Area of rectangle using class

6.Constructor and its types.

It is a special member function which is used to initilize the object of class.

It is automatically invoked when the object is created.

1.Default Constructor -> No argument

2.Parameterized Constructor -> With argument

3.Copy Constructor -> It initilizes the object of the existing class.

https://www.programiz.com/cpp-programming/constructors

7.Destructor

It is called when the class object goes out of scope such as when the function ends, the program ends.

https://www.tutorialspoint.com/destructors-in-cplusplus#:~:text=Destructors%20in%20C%2B%2B%20are%20members,delete%20variable%20is%20called%20etc.&text=Also%2C%20destructors%20have%20the%20same,preceded%20by%20a%20tilde(~).

8.Function overloading

Same function name but different working.

https://beginnersbook.com/2017/08/cpp-function-overloading/#:~:text=Function%20overloading%20is%20a%20C%2B%2B,(int%2C%20float)%20which%20is

9.Function Overridding

Same fuction with same signatures.

https://www.programiz.com/cpp-programming/function-overriding

10.This Pointers

https://www.javatpoint.com/cpp-this-pointer

11.Virtual Function

https://www.studytonight.com/cpp/virtual-functions.php

12.Abstract Class

https://www.geeksforgeeks.org/pure-virtual-functions-and-abstract-classes/

13.Friend Function

https://www.programiz.com/cpp-programming/friend-function-class

14.Random function

It generates the random number through rand() function.

https://www.geeksforgeeks.org/rand-and-srand-in-ccpp/