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C++ Language Syllabus in Hinglish

1. Introduction to C++

- **C++ ka Introduction:** C++ kya hai, aur C se uska difference kya hai.
- **History of C++:** C++ ka evolution aur uska importance.
- **Structure of C++ Program:** Basic C++ program ka structure samjho.
 - Main function, header files, etc.
- **First C++ Program:** "Hello World" likhna aur output samajhna.

2. C++ Basics

- **Data Types:**
 - int, float, double, char, bool ka use samajhna.
 - **Typecasting:** Implicit aur explicit typecasting ka concept.
- **Variables and Constants:**
 - Variables ko initialize karna.
 - Constants ka use (e.g., const keyword).
- **Input/Output:**
 - cin aur cout ka use karke input aur output.
 - **Formatting Output:** setw(), setprecision(), etc.

3. Operators in C++

- **Arithmetic Operators:** +, -, *, /, %.
- **Relational Operators:** ==, !=, >, <, >=, <=.
- **Logical Operators:** &&, ||, !.
- **Bitwise Operators:** &, |, ^, ~, <<, >>.
- **Assignment Operators:** =, +=, -=, *=, /=.
- **Increment/Decrement:** ++, --.

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4. Control Structures

- **Conditional Statements:**
 - if, else, else if, switch-case.
- **Loops:**
 - for loop, while loop, do-while loop.
 - **Break** aur **continue** ka use.
- **Nested Loops** aur **Nested Conditions**.

5. Functions in C++

- **Function Basics:** Function declaration, definition, and calling.
- **Return Type:** Functions with and without return types.
- **Passing Arguments:**
 - **Call by value** aur **call by reference**.
 - **Default Arguments**.
- **Inline Functions:** Function ko inline kaise define karein.
- **Recursion:** Functions ka apne aap ko call karna.

6. Arrays

- **One-dimensional Array:** Array ka use, initialization, aur access.
- **Two-dimensional Array:** Matrix creation aur operations.
- **Multi-dimensional Array:** 3D arrays ka use.
- **Array Manipulation:** Sorting aur searching arrays.

7. Strings

- **String Basics:** char array aur C++ string objects.
- **String Functions:** `strlen()`, `strcmp()`, `strcpy()`, `strcat()`, `substr()`.
- **String Manipulation:** Concatenate, compare, copy strings.
- **C++ String Class:** String class ka use (e.g., `std::string`).

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8. Object-Oriented Programming (OOP)

- **Classes and Objects:**
 - Class kya hota hai, aur uska object kaise banate hain.
 - Constructors and Destructors ka use.
- **Access Specifiers:** public, private, protected.
- **Member Functions:** Functions jo class ke andar define kiye jaate hain.
- **Encapsulation:** Data hiding aur abstraction ka concept.
- **Inheritance:** Base class aur derived class ka use.
 - **Single Inheritance:** Ek class se doosri class inherit karna.
 - **Multiple Inheritance:** Multiple classes se inheritance.
- **Polymorphism:**
 - **Compile-time Polymorphism:** Function overloading, operator overloading.
 - **Run-time Polymorphism:** Virtual functions, function overriding.
- **Abstraction:** Pure virtual functions aur abstract class.
- **Friend Function:** Function jo class ke private members ko access kar sakta hai.

9. Pointers in C++

- **Pointer Basics:** Pointer kya hota hai aur uska use.
- **Pointer with Arrays:** Pointer aur array ke beech relation.
- **Pointer to Function:** Function pointers ka concept.
- **Pointer to Class Members:** Class ke member functions ko pointer ke through call karna.
- **Dynamic Memory Allocation:** new, delete, new[], delete[].

10. Dynamic Memory Management

- **Dynamic Memory Allocation:**
 - new and delete operators ka use.
 - **Memory Leaks** ko avoid karne ke methods.
- **Constructor and Destructor:** Constructor aur Destructor ka proper use.

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11. File Handling

- **File Operations:**
 - File ko open karna (`ofstream`, `ifstream`).
 - Reading aur Writing data (`<<`, `>>`, `read()`, `write()`).
 - Closing file properly.
- **File Modes:** `ios::in`, `ios::out`, `ios::app`, etc.
- **Binary Files:** Binary files me data read aur write karna.

12. Exception Handling

- **Try-Catch Block:** Exceptions ko handle karne ka basic process.
- **Throwing Exceptions:** Custom exceptions ko throw karna.
- **Standard Exceptions:** Pre-defined exceptions ka use.
- **Exception Propagation:** Exception ka flow kaise hota hai.

13. Advanced C++ Topics

- **Templates:**
 - **Function Templates:** Ek hi function ko multiple types ke liye use karna.
 - **Class Templates:** Classes ko templates ke through define karna.
- **STL (Standard Template Library):**
 - **Vectors, Lists, Stacks, Queues, Maps, Sets** ka use.
 - **Iterators** ka use.
- **Lambda Functions:** C++11 me introduced lambda functions.
- **Smart Pointers:** `unique_ptr`, `shared_ptr`, `weak_ptr`.
- **Multithreading:** C++11 me threads aur concurrency ka introduction.
- **Regular Expressions:** Text search aur replace ke liye regular expressions ka use.

14. Miscellaneous

- **Namespaces:** `std` namespace aur custom namespaces ka use.
- **Preprocessor Directives:** `#include`, `#define`, `#ifdef`, etc.

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- **Type Defining:** `typedef` aur `using` ka use.
 - **Move Semantics:** Move constructor aur move assignment operator.
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Practice Projects

- **Simple Calculator:** Functions aur control structures ka use karke.
 - **Student Database Management System:** File handling aur classes ka use.
 - **Bank Management System:** OOP concepts jaise classes, inheritance ka use.
 - **Tic-Tac-Toe Game:** Arrays aur functions ka use karke game banaiye.
 - **Library Management System:** File handling, classes, aur data structures ko integrate karein.
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Important Notes

- **Practice Regularly:** C++ programming ko seekhne ke liye regular practice zaroori hai.
- **Understand Logic:** Sirf syntax na samajhkar, logic ko samajhna zaroori hai.
- **Debugging:** Apni mistakes ko samjho aur unhe fix karna seekho.