C++ LESSON MODULE: FOR LOOP

INTRODUCTION

In C++, the for loop is an entry-controlled loop used to execute a block of code repeatedly for a known number of iterations. It is most useful when the number of repetitions is determined before the loop starts.

SYNTAX AND STRUCTURE

for (initialization; test_condition; updation) {
// body of loop
}

- Initialization - sets up a counter variable.
- Test Condition - checked before each iteration; if false, loop stops.
- Updation - updates (increments or decrements) the counter.

Example workflow:

- Execute initialization once.
- Test condition — if true, run body; if false, exit.
- Execute body of the loop.
- Perform update step.
- Return to condition test.

EXAMPLE 1:
BASIC FOR LOOP

```cpp
#include <iostream>
using namespace std;

int main() {
    for (int i = 1; i <= 5; i++) {
        cout << i << " ";
    }
    return 0;
}
```

OUTPUT:

1 2 3 4 5

Explanation: Starts with i = 1, prints each number, and increments i until the condition (i <= 5) becomes false.

VISUALIZATION GUIDE

Visualize a for loop like a flowchart:

1. Initialization – create counter variable.
2. Condition Check – verify if loop should continue.
3. Execute Loop Body – perform actions.
4. Update – increment or modify loop variable.
5. Repeat Steps 2-4 until condition fails.

EXAMPLE 2: NESTED FOR LOOP

```cpp
#include <iostream>
using namespace std;

int main() {
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            cout << "* ";
        }
        cout << endl;
    }
    return 0;
}
```

OUTPUT:

* * *

* * *

* * *

Explanation: The inner loop prints stars horizontally, and the outer loop prints three rows.

EXAMPLE 2: NESTED FOR LOOP

```cpp
#include <iostream>
using namespace std;

int main() {
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            cout << "* ";
        }
        cout << endl;
    }
    return 0;
}
```

OUTPUT:

* * *

* * *

* * *

Explanation: The inner loop prints stars horizontally, and the outer loop prints three rows.

EXAMPLE 4: INFINITE LOOP

```
for (;;) {
cout << "This will run forever!" << endl;
}
```

Explanation: If the condition in the for loop always evaluates to true, the loop executes indefinitely:

REFERENCES:

HTTPS://WWW.GEEKSFORGEEKS.ORG/CPP/CPP-LOOPS/

HTTPS://WWW.GEEKSFORGEEKS.ORG/CPP/CPP-FOR-LOOP/

HTTPS://WWW.GEEKSFORGEEKS.ORG/CPP/NESTED-LOOPS-IN-C-WITH-EXAMPLES-2/