Air University
(Mid-Term Examination: Fall 2024)

Subject: **Programming Fundamentals**
Course Code: **CS-111**
Class: **BS-CYS**
Semester: **I**
Section: **Evening A/B**

HoD Signatures:

Total Marks: 60
Date:
Time:
Duration: **2 Hours**
FM Name:

FM Signatures:

Note:
- **All questions must be attempted.**
- **This examination carries 25% weight towards the final grade.**

	Q. No. 1 (CLO 1)	20 Marks
	Differentiate the following pairs of concepts	
a	Flag-Controlled while Loops vs Sentinel-Controlled while Loops	5
b	Multiprogramming vs Batch Processing	5
c	Short vs long Data Types Modifiers	5
d	Iteration Control & Selection control	5

	Q. No. 2 (CLO 2)	20 Marks
a	**Perform a dry run of the above C++ program for the following input values:** a) choice = 1 b) choice = 3 c) choice = 5 d) choice = 7 **Instructions:** •Track the flow of control through if-else, switch, while, and for loops. •Write down the output of each cout statement and explain what happens to the value of variables like choice and sum during execution. •Consider the effects of the switch statement on choice and the nested if-else in the for loop.	20

```
1  #include <iostream>
2  using namespace std;

3  int main() {
4      int choice, num, sum = 0;

5      // First cout statement
6      cout << "Enter a number (1-5): ";
7      cin >> choice;

8      // if-else statement
9      if (choice <= 0 || choice > 5) {
10         cout << "Invalid choice!" << endl;
```

```
    } else {
        // Second cout statement
        cout << "Processing choice " << choice << "!" <<
endl;

        // switch statement with additional actions
        switch (choice) {
            case 1:
                cout << "Option 1: Incrementing choice by 2."
<< endl;
                choice += 2;
                break;
            case 2:
                cout << "Option 2: Reducing choice by 1." <<
endl;
                choice -= 1;
                break;
            case 3:
                cout << "Option 3: Doubling the choice." <<
endl;
                choice *= 2;
                break;
            case 4:
                cout << "Option 4: Setting choice to 1." <<
endl;
                choice = 1;
                break;
            case 5:
                cout << "Option 5: Leaving choice unchanged."
<< endl;
                break;
        }

        // while loop to calculate sum of all numbers up to
choice
        int i = 1;
        while (i <= choice) {
            sum += i;
            // Third cout statement
            cout << "While loop iteration " << i << ": sum =
" << sum << endl;
            i++;
        }

        // for loop with different logic
        for (int j = 1; j <= choice; j++) {
            if (j % 3 == 0) {
                // Fourth cout statement
                cout << "For loop iteration " << j << ":
divisible by 3." << endl;
            } else {
                // Fifth cout statement
                cout << "For loop iteration " << j << ": not
divisible by 3." << endl;
            }
        }
    }
```

```
    // Final cout statement
    cout << "Program completed! Final value of sum: " << sum
<< endl;
    return 0;
    }
```

	Q. No. 3 (CLO 3)	20 Marks
	Write the code for the following programs	
a	Write a C++ program to print one of the following pattern on the screen. N=7 for each case, N is a variable:  OR 	10
b	A palindrome is a number or a text phrase that reads the same backwards as forwards. For example, each of the following integers is a palindrome: 121, 55555, 4554 and 113311. Write an program that reads in a five-digit integer and determines whether it is a palindrome.	10

********** End of Question Paper **********