COMSATS University Islamabad

Lahore Campus

**Department of Computer Science**

**Midterm BCS Solution – Spring 2023**

**Course Title:** Programming Fundamentals  **Course Code:**

**Resource Person:** Dr. Muhammad Aksam Iftikhar **Credit Hours:** 3

**Time allowed:** 1.5 Hours **Total Marks:** 25

**Note:** There are no errors in the code, for which you have to write output of the code in some questions. Just write the output as per your understanding.

**Question 1. [MCQs: 6 Marks] CLO-1, Understanding;**

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| 1. Which of the following statements is true about the switch statement in C++?   a) The switch expression must be of an integer type  b) The break statement is optional inside a switch case  c) The default case is mandatory  **d) Both a) and b)** | 1. Which of the following loops is an example of a sentinel-controlled loop?   a) for (int i = 0; i < 10; i++) { /\* statements */ }*  ***b) while (num != -1) { /* statements */ }***  *c) do { /* statements \*/ } while (num > 0);  d) None of the above | |
| 1. In the given code snippet, which loop will execute the same set of statements for the same number of times?   **// Loop A**  for (int i = 2; i <= 100; i \*= 2) { /\* statements \*/ }  **// Loop B**  int j = 2;  while (j <= 100) {      /\* statements \*/      j += 2;  }  a) Loop A will execute more times than Loop B  **b) Loop B will execute more times than Loop A**  c) Both loops will execute the same number of times  d) Both loops will result in a compile-time error | 1. Suppose the input is 3. What is the value of beta after the following C++ code executes?   A picture containing text  Description automatically generated  Text  Description automatically generated with medium confidence   1. **7** 2. 6 3. 3 4. 4 | |
| 1. Consider the following nested loop structure:   for (int i = 0; i < 3; i++) {      for (int j = 0; j <= i; j++) {          cout << (i + j) % 10;      }      cout << endl;  }  What will be the output of this code snippet?  **a) 0\n1\n2\n**  **b) 0\n01\n012\n**  **c) 0\n12\n345\n**  **d) 0\n12\n24\n** | 1. You are given a task to read a single integer value and a line of text from the user input. Which of the following code snippets will correctly read the integer and the entire line of text, even if it contains whitespaces?   a) cin >> num; getline(cin, text);  **b) cin >> num; cin.ignore(); getline(cin, text);**  c) cin >> num; cin >> text;  d) cin.get(num); getline(cin, text); | |
| **Question 2. [6+4+2=12 Marks] CLO-2, Applying;**  **Provide the answer to each of the following questions in the space provided below each question.** | |

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| 1. Look at the following program, which accepts an input (num) from the user, and write down the output for all 3 test cases given below the program.   int num = 5;  bool mystery = true;  cout << "Enter a number between 2 and 20: ";  cin >> num;  if (!cin || num < 2 || num > 20) {      cout << "Invalid input!" << endl;  } else {      for (int i = 2; i <= num / 2; i++) {          if (num % i == 0) {              mystery = false;              break;          }      }      if (mystery) {          cout << num << " is a mystery number." << endl;      } else {          cout << num << " is not a mystery number." << endl;          for (int i = 1; i <= num; ++i) {              for (int j = 1; j <= i; ++j) {                  cout << setw(2) << j \* i << " ";              }              cout << endl;          }      }  } | Test Case 1: user input = 7  OUTPUT:  **7 is a mystery number.**  Test Case 2: user input = 4  OUTPUT:  **4 is not a mystery number.**  **1**  **2 4**  **3 6 9**  **4 8 12 16**  Test Case 3: user input = 25  OUTPUT:  **Invalid Input!** |
| 1. What will be the output of the following C++ code.      #include <iostream>  using namespace std;  int main() {      int i = 1;      while (i <= 3) {          int j = 1;          while (j <= 3) {              if (i == j) {                  cout << "D" << "";                  j++;                  continue;              }              else if (i + j == 5) {                  cout << "S" << "";                  break;              }              else                  cout << "\*";              j++;          }          cout << endl;          i++;      }      return 0;  } | **D\*\***  **\*DS**  **\*S** |
| 1. Rewrite the following statement using the nested if-else structure. Assume x, a, str and b are already declared.    * 1. x= ( (a>3 && str==“stop”) ? 5: (a<3 ? 3 : a+b)); | **if (a>3 && str==“stop”)**  **x = 5;**  **else if (a<3)**  **x = 3;**  **else**  **x = a+b;** |

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| **Question 3. [7 Marks] CLO-2, Applying;** |

**Problem Statement:** Write a small program that reads data from a file named "temperature\_data.dat", which contains the following data.

15 35

12 28 22 40 8 34 30 15 19 20

The first two numbers represent the moderate temperature range for a specific environment. The program should read these numbers and then read all the numbers on the next line until end of file, which represent the recorded temperatures. Finally, the program should display how many of the recorded temperatures are “low-to-moderate“ (e.g. below 35 in this case) or “moderate-to-high” (e.g. above 15 in this case). In the above example, the program should output:

Number of low-to-moderate temperatures: 9

Number of moderate-to-high temperatures: 7

**Solution:**

#include <iostream>

#include <fstream>

int main() {

    int low, high;

    int temp;

    int low\_to\_moderate = 0;

    int moderate\_to\_high = 0;

    std::ifstream inputFile("data.txt");

    if (inputFile.is\_open()) {

        inputFile >> low >> high;

        while (inputFile >> temp) {

            if (temp < high) {

                low\_to\_moderate++;

            }

            if (temp > low) {

                moderate\_to\_high++;

            }

        }

        inputFile.close();

        std::cout << "Number of low-to-moderate temperatures: " << low\_to\_moderate << std::endl;

        std::cout << "Number of moderate-to-high temperatures: " << moderate\_to\_high << std::endl;

    } else {

        std::cout << "Unable to open file temperature\_data.dat" << std::endl;

    }

    return 0;

}