



Section II: Subjective
(To be solved on Answer Books only)

Subject: Programming Fundamentals
Class: BsCyS Fall 2024
Section(s): A & B
Course Code: CS111

Time Allowed: 2 hr. 40 mints

Max Marks: 70

FM's Name: Khwaja Mansoor

FM's Signature:

INSTRUCTIONS

- Attempt responses on the answer book only.
- Nothing is to be written on the question paper.
- Rough work or writing on question paper will be considered as use of unfair means.

	<p>Q1.a Write the outputs of the following programs</p> <pre>void main(){ int b=6,c=5; if (b++ == 7 && ++c == 5) { b*=c; cout<<++b<<endl; } else cout<<b--<<endl; }</pre>	<p>Marks (5x5=25)</p> <p>CLO = 2</p>
Q1.b	<pre>void main(){ int n = 5, a=4, b=0,c=8; if(b<=6 && c>4 a++ == 6) n++; if(b!=4 && b>5 c<=9) n+=a++; if(c<=2 a >= 5 && b-- == 0) n* = a++; cout<<n; }</pre>	
Q1.c	<pre>void main () { for (int line = 1; line <= 5; line++){ for (int j = 1; j <= (-1 * line + 5); j++) cout<<"*"; cout<<line<<endl; } getch(); }</pre>	

Q1.d	<pre> void main(){ int a[4][4],k,j; for(k=0;k<=3;k++) for(j=0;j<=3;j++) a[k][j]=(k+1)*(j+1); for(k=0;k<4;k++) cout<<a[k][k]; for(k=0;k<4;k++) cout<<a[3-k][k]; getch(); } </pre>	
Q1.e	<pre> void B(int e,int &f){ e=5; f=10; } void A(int &c,int d){ d=5; B(c,d); } void main(){ int a=2,b=3; A(a,b); cout<<a<<endl<<b<<endl; getch(); } </pre>	
Q2.	<p>Student Management System</p> <p>You are tasked to develop a Student Management System for a university using C++ structures and functions. The system will store student records, display them, and calculate the average marks of all students.</p> <p>Requirements:</p> <p><u>1. Structure Definition:</u></p> <p>Define a structure named Student with the following fields:</p> <ul style="list-style-type: none"> • name (string) – to store the student's name (max 50 characters). • rollNumber (integer) – to store the student's roll number. • marks (array of 3 floats) – to store marks of three subjects. • average (float) – to store the average of the 3 subjects. 	<p>Marks (20)</p> <p>CLO = 4</p>

2. Function Implementation

Write and implement the following functions:

- void inputStudentData(Student &s);

A function that takes a reference to a Student structure and allows the user to input:

The name, roll number, and marks (3 subjects) of the student.

- void calculateAverage(Student &s);

A function that calculates the average marks for a given student and stores it in the average field.

- void displayStudentData(const Student &s);

A function that takes a Student structure and displays:

Name, Roll Number, Marks of all subjects, and the Average Marks.

- void displayTopper(const Student students[], int size);

A function that takes an array of students and its size and displays the details of the student with the highest average marks.

3. Program Logic and User Interaction

In the main () function:

- Prompt the user to enter the total number of students (up to a maximum of 5).
- Use a loop to input details for each student using inputStudentData().
- Call calculateAverage() to compute the average marks for each student.
- Display the details of all students using displayStudentData().
- Identify and display the topper (student with the highest average) using displayTopper().

Program Constraints:

- The program must use functions to modularize the code.
- The Student structure must be passed to functions using reference or const reference.
- Array of structures must be used to store student details.
- Proper user prompts and output formatting must be implemented.

Q3.	<p>Create a 2D array of size 4×4. Write a program that takes input from the user to fill the first three columns of the array. Then calculate the sum of the values in the first three columns for each row and store the calculated sum into the fourth column of the array. Finally, display the complete 2D array, including the sums in the fourth column.</p> <p>Example:</p> <table border="1"> <tr> <td>3</td><td>4</td><td>5</td><td>12</td></tr> <tr> <td>1</td><td>2</td><td>3</td><td>6</td></tr> <tr> <td>5</td><td>3</td><td>1</td><td>9</td></tr> <tr> <td>7</td><td>6</td><td>3</td><td>16</td></tr> </table>	3	4	5	12	1	2	3	6	5	3	1	9	7	6	3	16	<p>Marks (15)</p> <p>CLO = 2</p>
3	4	5	12															
1	2	3	6															
5	3	1	9															
7	6	3	16															
Q4.	<p>Explain the Stream Class Hierarchy in C++ and describe the purpose of its major classes, including <i>istream</i>, <i>ostream</i>, <i>iostream</i>, and their derived classes. Provide an example scenario where you would use a specific stream class to handle input and output operations efficiently.</p>	<p>Marks (10)</p> <p>CLO = 3</p>																