CL-1002
Programming Fundamentals
Lab # 8

Objectives:

- Practice and understanding on basic c++ programs

Note: Carefully read the following instructions (*Each instruction contains a weightage*)

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function about its functionality.
3. Use understandable name of variables.
4. Proper indentation of code is essential.
5. Write a C++ statement(s) for each of the following task one after the other, in the same order.
6. Make a Microsoft Word file and paste all of your C++ code with all possible screenshots of **every task output in MS word and submit .cpp file with word file**.
7. Make separate .cpp files for all tasks and use this format **23F-1234_Task1.cpp.**
8. First think about statement problems and then write/draw your logic on copy.
9. After copy pencil work, code the problem statement on MS Studio C++ compiler.
10. At the end when you done your tasks, attached C++ created files in MS word file and make your submission on Google classroom. (Make sure your submission is completed).
11. Please submit your word file in this format **23F-1234_L1.docx**
12. Do not submit your assignment **after the deadline**.
13. **Do not copy code from any source otherwise you will be penalized with negative marks.**

Problem No 1| If else-if else

Write a program that input a marks out of 100 from the user and displays his/her grades.
1. If marks are greater than 80 display “You got A grade”
2. If marks are greater than 50 display “You got B grade”
3. If marks are greater than 40 display “You got C grade”
4. If marks are below than 40 display “You got F grade”

Note: Number must be 1 to 100 otherwise display invalid number.

Problem No 2| If else

Suppose that x, y, and z are int variables, and x = 6, y = 25, and z = 100. Write a single C++ code to determine whether the following expressions evaluate to true or false.

a) !(x > 10)
b) x <= 5 || y < 15
c) (x != 5) && (y != z)
d) x >= z || (x + y >= z)
e) (x <= y - 2) && (y >= z) || (z - 2 != 20)

Problem No 3| If else-if else

A program uses a char variable named membership and an int variable named age. The membership variable contains one of the following letters (entered in either uppercase or lowercase): M or N. The letter M stands for *member*, and the letter N stands for *non- member*. The program should display the appropriate seminar fee, which is based on a person’s membership status and age. The fee schedule is shown in Figure. Write the C++ code to display the fee. (Use if-else and nested if-else to solve the problem)

Rs. 10000	Club member less than 65 years old
Rs. 5000	Club member at least 65 years old
Rs. 15000	Non-members

Problem No 4| If else-if else

Write a program that generates a random number between 1 and 100. If number is less than 50 then it display “Input number is small” and if number is greater than 50 it display “Input number is large” and if number is 50 then “Input number is average”. Remember your input number is not less than 1 and not greater than 100.

Problem No 5| If else-if else

Write a program to calculate the electricity bill of FAST-NU Faisalabad. The rates of electricity per unit are as follow:

a) If the units consumed are equal or less than 100, then the cost is Rs. 10/- Per unit and no surcharge of bills is added.

b) If units consumed are within 101-300, then the cost is Rs. 12.5/- per unit and a surcharge of 10% of bill is added.

c) If units consumed more than 300, then the cost is Rs. 15/- per unit and a surcharge of 20 % is added.

Keep in mind that you should take values form user in the current and previous reading forms.

For example I have reading of month January 3466 units and counting for February. I will enter previous reading 3466 and current reading will be 3600 for February. So I get (3600-3466= 144units).

Note:

a) The answer should be as precise as you can.
b) Mean that use int where int use and use float/double where use.

Problem No 6| Switch

Write a program to take the value from the user as an input week number and print weekday by using the switch statement.

Problem No 7| Switch

You are tasked with creating a program for a movie theater that calculates the ticket price based on the age of the customer. The theater has different pricing categories:

- Children (age 0-12): $5
- Teenagers (age 13-17): $8
- Adults (age 18-59): $12
- Seniors (age 60 and above): $6

Write a program that takes the age of the customer as input and uses a switch statement to calculate and output the corresponding ticket price.

Problem No 8| Nested Switch

You are developing a program for a pizza ordering system. The program should take two inputs: pizza size (1 for Small, 2 for Medium, 3 for Large) and pizza type (1 for Margherita, 2 for Pepperoni, 3 for Veggie). Based on these inputs, calculate and display the total cost of the pizza.

Pricing details:

1. Small pizza: $8
2. Medium pizza: $12
3. Large pizza: $15

Additional charges for specific types:

1. Margherita: No additional charge
2. Pepperoni: $2 extra
3. Veggie: $3 extra

For example:

Input:
Pizza Size: 2 (Medium)
Pizza Type: 3 (Veggie)
Output:
Total Cost: $15 (Medium pizza base cost) + $3 (Veggie extra charge) = $18
Implement the solution using nested switch statements.

Problem No 9| Ternary Operator

Create a program that takes a temperature value in Celsius as input and classifies it into different categories using a ternary operator. The categories are as follows:

- Freezing: Below 0°C
- Cold: 0-10°C
- Moderate: 11-20°C
- Warm: 21-30°C
- Hot: Above 30°C

For example:

Input: 15
Output: Moderate
Implement the solution using the ternary operator.

Problem No 10| University Admission Criteria | Nested If

A university has the following admission criteria for engineering programs:

1. Minimum Qualifications:
   - Physics, Chemistry, and Mathematics are mandatory subjects.
   - Minimum 60% aggregate in Physics, Chemistry, and Mathematics.

2. Additional Criteria for Specialization:
   - Computer Science Specialization:
     - Additional requirement: Minimum 70% aggregate in Physics, Chemistry, and Mathematics.
     - Additional subject: Computer Science (compulsory).
   - Mechanical Engineering Specialization:
     - Additional requirement: Minimum 65% aggregate in Physics, Chemistry, and Mathematics.
     - Additional subject: Mechanical Engineering (compulsory).
   - Electrical Engineering Specialization:
     - Additional requirement: Minimum 68% aggregate in Physics, Chemistry, and Mathematics.
     - Additional subject: Electrical Engineering (compulsory).

Write a program that takes the subject marks and the chosen specialization as input and determines whether a student is eligible for admission and, if so, for which specialization.

Problem: 11 (for loop)

Write a C++ program that generates and prints the Fibonacci series up to a specified number of terms. The program should take an integer n as input, representing the number of terms in the series. Use a for loop to calculate and display the Fibonacci series.

The Fibonacci series is defined as follows:

The first two terms are 0 and 1.
Each subsequent term is the sum of the two preceding terms.
For example:

Input: 8
Output: 0, 1, 1, 2, 3, 5, 8, 13

Problem: 12 (for loop)

Write a program that uses a for loop to find a series number.
Consider the following sequence of numbers: n(a),
n(a+1), n(a+2),n(a+3),…n(an+b)

Note: Do not put "," after last digit as mentioned is output

Problem: 13 (For loop)

Write a program that will calculate the average of n numbers. Input all number(s) from user and display there average.
For example

Enter limit of numbers= 2
Enter number 1= 10

Enter number 2= 10 Average of numbers = 10

Problem: 14 (For loop)

Write a C++ program that takes an integer as input and determines whether it is a prime number. The program should use a for loop to check for factors of the given number.

A prime number is a natural number greater than 1 that is not a product of two smaller natural numbers.

For example:

Input: 17
Output: Prime

Problem: 15 (For loop)

White a program that find the Lest Common Multiple by getting input of two numbers from user.
Hint: LCM of two integers a and b is the smallest positive integer that is divisible by both a and b.

Problem: 16 (For loop)

The population of a town A is less than the population of town B. However, the population of town A is growing faster than the population of town B. Write a program that prompts the user to enter the population and growth rate of each town. The program outputs after how many years the population of town A will be greater than or equal to the population of town B and the populations of both the towns at that time. (A sample input is: Population of town A = 5000, growth rate of town A = 4%, population of town B = 8000, and growth rate of town B = 2%.).

Problem: 17 | (for loop)

Armstrong number is a number that is equal to the sum of cubes of its digits. For example 0, 1, 153, 370, 371 and 407 are the Armstrong numbers.
Example:
371 = (3*3*3)+(7*7*7)+(1*1*1)
where:
(3*3*3)=27
(7*7*7)=343
(1*1*1)=1
So:
27+343+1=371
Write a code to check if a number is Armstrong or not. Number must be in the range of selected datatype.

Proper text alignment and screenshots will hold extra marks!

Best of luck ☺

You are done with your exercise, submit to the classroom at given time.