DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
DHAKA UNIVERSITY OF ENGINEERING & TECHNOLOGY, GAZIPUR
B.Sc. Engineering 1st Year 2nd Semester **(Regular)** Examination, 2022
Course No.: CSE 1121
Course Title: Structured and Object Oriented Programming Language

Time: 3 Hours Full Marks: : 210

Instructions: (a) Answer any three questions from each section.
(b) Use separate answer scripts for each section.
(c) All questions are of equal value.
(d) Figures in the right margin indicate full marks.

Section- A

1. (a) Explain in detail call by value and call by reference with example. [CLO1] 10
   (b) Write a function in C/C++ that, when you call it, displays a message telling how many times it has been called: "`I have been called 3 times`", for instance. Write a ***`main()`*** program that calls this function at least 10 times. [Hint: Use a local static variable]. [CLO3] 10
   (c) Write a C language program using recursive function to enter 4 digit number and find the sum of all digits of the number. [CLO4] 15

2. (a) Why some of the functions in a class are defined as Inlined? State the restrictions and advantages of Inline function. (5+3+2) [CLO2] 10
   (b) A point on the two-dimensional plane can be represented by two numbers: an x coordinate and a y coordinate. For example, (4, 5) represents a point. The sum of two points can be defined as a new point whose x coordinate is the sum of the x coordinates of the two points, and whose y coordinate is the sum of the y coordinates. 15
   Create a class called ***`Point`*** to model a 2D point. The class should have one constructor to initialize these data to 0, and another should initialize them to fixed values. Another member function should display it, in (x, y) format. The final member function ***`addPoint()`*** should add two objects of type ***`Point`*** passed as arguments.
   A ***`main()`*** function should create two initialized and one uninitialized point objects. Then set the third point equal to the sum of the other two, and display the value of the new point. [CLO4]
   (c) Define conversion function with syntax. For the class referred in question **2(b)**, define a conversion function so that a ***`Point`*** object could be converted into floating-point data, returning the summation of x and y coordinates. (3+2+5) [CLO2] 10

3. (a) What is ***`this`*** pointer? Write down its usefulness using a suitable example. (5+5) [CLO2] 10
   (b) Is operator overloading feature of OOP model a kind of polymorphism? Validate your answer. (3+7) [CLO2] 10
   (c) Referring to the class mentioned in question **2(b)**, overload Plus (+) operator replacing the ***`addPoint()`*** function. Also overload the Minus (-) and increment operator (++) in prefix form (assume that ++ operator will increase only y-coordinate of the point by 1). Design the overloaded function such a way that all functions should return an object of the same class. (5×3) [CLO4] 15

4. (a) State how a template function is different from an overloaded function? [CLO2] 10
   (b) Write down a C++ program that uses a template function that returns the average of all the elements of an array. The arguments to the function should be the array name and the size of the array (type int). In ***`main()`***, call the function with arrays of type int, long, double, and char. [CLO3] 10
   (c) Write an interactive program to compute factorial of a number. The input value must be tested for validity. If it is negative, the user defined function ***`factorial()`*** should raise an exception. You must use C++ exception handling mechanism to handle the wrong user input. [CLO3] 15

Contd. P/2

Section- B

5. (a) How many loop control structures are used in C programming? Describe them properly. [CLO1] 07

(b) The numbers in the sequence 1 1 2 3 5 8 13 21..... are called Fibonacci numbers. Write a program using for loop to calculate and print the first ***m*** Fibonacci numbers. [CLO3] 13

(c) Write a program using a two-dimensional array to compute and print the following information from the sales table of a shop given below: [CLO4] 15

i) Total value of sales by each girl.
ii) Total value of each item sold.
iii) Grand total of sales of all items by all girls.

	Item1	Item 2	Item3
Salesgirl #1	310	275	365
Salesgirl #2	210	190	325
Salesgirl #3	405	235	240
Salesgirl #4	260	300	380

Table: Sales table.

6. (a) Explain the significance of inheritance, encapsulation, and polymorphism - the three fundamental attributes of object-oriented programming - using your own words? [CLO2] 12

(b) Write a program to copy one string to another using for loop and count the number of characters copied. [CLO3] 10

(c) Write a program that demonstrate the utilization of constructor and destructor functions in OOP. [CLO3] 13

7. (a) Explain the difference between public, private, and protected inheritance in C++ with an example. [CLO2] 10

(b) How does ambiguity arise in multiple inheritances in C++? Explain how this problem can be solved with an example. (3+7) [CLO3] 10

(c) Write a C++ program using virtual function to display the status of a country considering the followings: If a country has 2,00,000 *square km* in area, it is a big country; otherwise it is a small country. If a country has $1,00,000 savings in world bank, it is developed; otherwise not. The base class is ***world*** and derived classes are ***big-country*** and ***developed-country***. [CLO3] 15

8. (a) What is friend function? When does a friend function become compulsory? (2+5) [CLO2] 07

(b) The class ***Distance*** has two data member ***feet(int), inches(float)***. Write a program that uses a friend function to perform the following operations: [CLO3] 14

```
int main()
{
  Distance dist(3, 6.0); //two-arg constructor (3'-6'')
  float sqft;
  sqft = square(dist); //return square of dist
  //display distance and square
  cout << "\nDistance = "; dist.showdist();
  cout << "\nSquare = " << sqft << " square feet\n";
  return 0;
}
```

(c) Write an OOP program to implement the push, pop, and display operation of a stack by using a class called ***Stack***. [CLO3] 14

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