DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
DHAKA UNIVERSITY OF ENGINEERING & TECHNOLOGY, GAZIPUR

B.Sc. Engineering 1st Year 2nd Semester **(Regular)** Examination, 2021

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) Justify the statement- "C is a mid-level Language". [CLO2] 10
   (b) Show the use of 'continue' and 'break' statements with respect to iterative structures in C with suitable example. (04+06) [CLO2] 10
   (c) Write a C program to take an integer number input and find the largest digit in the number and print that number in word with appropriate message. [CLO3] 15

   Sample Input: `Enter an Integer: 5472`
   Sample Output: `Seven is the largest digit`

2. (a) Compare between a 'Structure' and a 'class'. Show with an appropriate example, how do a class achieve data hiding. (05+05) [CLO1, CLO2] 10
   (b) Define friend function with its properties? Explain with an example, in which situations, friend function is useful. (02+03+05) [CLO1, CLO2] 10
   (c) Create a class called **Time** that has separate int member data for *hours, minutes*, and *seconds*. One constructor should initialize this data to 0, and another should initialize it to fixed values. Another member function should display it, in hh:mm:ss format. The final member function *addTime()* should add two objects of type time passed as arguments. 15

   A main() program should create two initialized time objects and one that isn't initialized. Then it should add the two initialized values together, leaving the result in the third time variable. Finally, it should display the value of this third variable. [CLO3]

3. (a) What is operator overloading? Why is it needed? (05+05) [CLO2] 10
   (b) Referring to the class mentioned in Q2(c), overload Plus (+) operator replacing the *addTime()* function. Also overload increment operator (++) in postfix and prefix form. (05x03) [CLO4] 15
   (c) What do you understand by function inlining? Without using Inline keyword, how a function be inlined? (05+05) [CLO2] 10

4. (a) Demonstrate the exception handling mechanism in C++ with appropriate block diagram. [CLO4] 10
   (b) Explain why using a default argument is related to function overloading. Identify the error in the following declaration. (07+03) [CLO3] 10

   ```
   int f(int a=0, double balance );
   ```

   (c) Develop an interactive program to compute square root of a number. The input value must be tested for validity. If it is negative, the user defined function ***my_sqrt()*** should raise an exception. [CLO4] 15

Contd. P/2

Section- B

5. (a) Explain the class and object concept in the programming language. How is it different from structured programming? (05+05) [CLO2] 10

   (b) Create a class named "Family" which has three data member size, names, ages and four functions display(), avg(). The display function should print the average age of the family, 15
   the names and ages of the family member.
   Also write a main function to create two objects of the family class and, find the eldest and youngest family member between two families. [CLO3]

   (c) Write a program to reverse digits of a given a 32-bit signed integer. [CLO3] 10
   Original integer: 123
   Reverse integer: 321

6. (a) What is a virtual function? How can you use a virtual function to achieve run-time polymorphism with a proper example? (05+10) [CLO2] 15

   (b) Write a CPP class that would print the information (name, establishment year, address) of an organization. The class should include, [CLO3] 10
   i. Constructor to initialize the values
   ii. Destructor and a display function

   (c) What is inheritance? Describe the types of Inheritance with an example. (02+08) [CLO1] 10

7. (a) Differentiate between early binding and late binding. Explain the usage of scope resolution operator with an example. (05+07) [CLO1] 12

   (b) Write a program to swap two arrays using pointers. [CLO3] 08

   (c) Consider a class hierarchy starting with a base class **Parallelogram**. Two derived classes named **Rectangle** and **Rhombus** inherit the class **Parallelogram**. There is another class **Square** inherits both the **Rectangle** and **Rhombus** class. Explain what problem may arise with this class hierarchy and how we can resolve it. Write the correct program. [CLO1] 15

8. (a) Differentiate between function overloading and overriding with proper examples. [CLO1] 10

   (b) Write their significance in a class hierarchy. [CLO1] 10

   (c) Create two classes named **Mammals** and **MarineAnimals**. Create another class named **BlueWhale** which inherits both the above classes. Now, create a function in each of these classes which prints "I am mammal", "I am a marine animal" and "I belong to both the categories: Mammals as well as Marine Animals", respectively. Now, create an object for each of the above classes and try calling 15
   i. The function of the classes by the objects of that corresponding classes
   ii. The function of each of base classes by the object of **BlueWhale**. [CLO4]

--End--