National Institute of Technology Hamirpur
End Semester Examination, Odd Semester 2023-24
Object Oriented Programming (CS-211)

Time: 09:30 AM – 12:30 PM   Date: 22-11-2023

Duration: 3 hours   Max. Marks = 50

Note 1: Attempt all questions from 1 to 5.

Note 2: If required to solve a question, make & and state your assumptions clearly.

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1.   [4+3+3=10 Marks]

   (a) Explain the concept of data hiding using a suitable example. Is it possible to access the private data members without using member functions? If yes, explain the procedure with programming example.

   (b) Explain procedure-oriented programming using suitable example. Briefly describe some issues present in procedure-oriented programming and how they are resolved in OOP.

   (c) Differentiate between function overloading and function overriding in C++ using suitable code examples.

2.   [5+5=10 Marks]

   (a) Formulate the problem of calculating the sum of n (1 to n) natural numbers as a recursion. Write the C++ program that implements the recursion. The implementation should ensure that when the number n is not provided, the sum up to 10 should be calculated.

   (b) Consider 2 arrays A and B. A contains the elements 2, 4, 8, 32, 16, 60, 70, 89, 98. B contains the elements 3, 7, 9, 30, 35, 24. Write a C++ program that merges A and B in a third array C such that C contains 2, 3, 4, 7, 8, 9, 32, 30, 16, 35, 60, 24, 70, 89, 98. All operations of arrays must be done through pointers only.

3.   [5+5=10 Marks]

   (a) Explain the motivation behind making some member functions of a class private using suitable examples. Explain how memory allocation happens for the data members and member functions in classes using a suitable diagram.

   (b) What is the main difference between regular classes and generic classes? Explain the different types of generic components available in C++ using suitable code examples.

4.   [5+5=10 Marks]

   (a) Demonstrate hybrid inheritance with the help of a suitable example. What specific type of hybrid inheritance will result in ambiguity? Explain with example/code snippets how the resultant ambiguity can be resolved?

   (b) What is the difference between files and streams in C++? Show how you can store data contained in objects on disk using the facilities available in C++ and relevant code snippets.

5.   [5+5=10 Marks]

   (a) What is the difference between errors and exceptions? Explain the different types of exceptions with examples. Write a program in C++ containing functions that demonstrates the use of throw keyword, multiple catch statements including a catch all statement, and restricting the types of exceptions allowed to be thrown.

   (b) Explain the difference between algorithms and iterators in Standard Template Library (STL) of C++ using suitable examples. Write a program in C++ to demonstrate the usage of set container from STL.

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