H

TCS–307

B. TECH. (CSE) (THIRD SEMESTER) END SEMESTER EXAMINATION, Dec., 2023

OBJECT ORIENTED PROGRAMMING WITH C++

Time : Three Hours
Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Discuss the importance of namespaces. How does it help to resolve the confliction of similar classes, functions or variables when using in a same namespace ? Discuss with example. (CO1)

P. T. O.

(b) Print a given matrix in spiral from using C++ program. Example :   (CO1)

Sample Input :

{{1, 2, 3, 4},

{5, 6, 7, 8},

{9, 10, 11, 12},

{13, 14, 15, 16}}

Sample Output :   1 2 3 4 8 12 16 15 14

13 9 5 6 7 11 10

(c) Why do we prefer object oriented programming instead of procedural programming ? Discuss various concepts of OOPs with proper example.   (CO1)

2. (a) Discuss the importance of constructors and destructors with codes. Also discuss dynamic objects, how they are different from static objects ?   (CO2, CO5)

(b) Discuss the requirement of operator overloading. Write a program to overload greater than operator ("ived>") using friend function to compare two objects having one integer instance variable. (CO2, CO5)

(c) Write a C++ program to create a vector with five elements and perform the following operations : (CO2, CO5)

(i) Add a new element at end and show the capacity,

(ii) Remove from end and show the size,

(iii) Add element at start and 3rd position,

(iv) Remove all elements and then show the capacity again.

3. (a) "Inheritance can be used to promote reusability of the code." Explain this statement with the help of a real-world example along with appropriate C++ code. Also explain multiple inheritance, and the ambiguity that might arise with it. Also discuss the solution for this. (CO3)

(b) Discuss diamond problem with the help of a real-world example. Explain the solution for this problem highlighting the advantages and potential drawbacks as well. Use appropriate code wherever required. (CO3)

(c) Explain public, private, and protected modes of inheriting a class. Explain how inheritance causes tight dependency between classes which causes problem in code maintenance. (CO3)

4. (a) Discuss the following with suitable code : (CO4)

    (i) Virtual functions

    (ii) Pure virtual functions

    (iii) Abstract classes

    (iv) Function overriding

(b) State the major differences between normal and virtual destructors using suitable code. Along with that, explain the need of choosing to use virtual destructor instead of the normal destructors in run-time polymorphism. (CO4)

(c) Solve the following problem by using Runtime polymorphism : (CO4)

Following tables outlines the major credit cards you might want to validate, along with their allowed prefixes and lengths.

Major Credit Cards, Their Prefixes, and Lengths.

Card Type	Prefixes	Length
Master Card	51–55	16
Visa	4	13,16
American Express	34,37	15

Sample valid Credit Card Numbers

Card Type	Sample Number	Output
MasterCard	5500 0000 0000 0004	Valid Card
Visa	4111 1111 1111 1111	Valid Card
American Express	3400 0000 0000 009	Valid Card

Sample Invalid Credit Card Numbers

Card Type	Sample Number	Output
MasterCard	5800 0000 0000 0004	Invalid Card
Visa	7111 1111 1111 1111	Invalid Card
American Express	1900 0000 0000 009	Invalid Card

5. (a) Discuss the advantages of function templates. Create a function called swaps () the interchanges the values of the two arguments provided to it. Make the function into a template, so it can be used with various data types like char, int and float. Write a main() program to exercise the function with various data types. (CO5)

(b) Create a user defined exception for the following scenario : (CO5)

Many people use banks. The clients have a name, account number, and balance, among other details. The deposit() and withdrawal() functions let clients to make deposits and withdrawals from their accounts, respectively. In the event that a client requests a larger withdrawal from their account than what is available, a "LowBalance Exception" will take place.

The client will see a If client will try to withdrawal 2000 INR then output is :

"Low balance exception."

(c) Discuss the various file opening modes that are defined in C++. Also write a program to read text from the keyboard, then write it to some text file like "Abc.txt". Then read this content and write back to the console.　　　(CO5)