



VIT

Vellore Institute of Technology

Established in the year 1984 under section 3 of the U.C.A. Act, 1956

Final Assessment Test – May 2024

Course: **BCSE102L - Structured and Object-Oriented Programming**

Class NBR(s): **3270/3282/3283**

Slot: **A1**

Time: **Three Hours**

Max. Marks: **100**

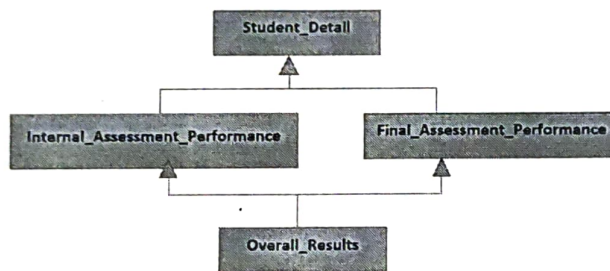
- **KEEPING MOBILE PHONE/ELECTRONIC DEVICES EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE**
- **DON'T WRITE ANYTHING ON THE QUESTION PAPER**

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. Develop a C program to find the smallest and largest prime number exist in the range of two integers X and Y given by the user. Then, by subtracting one from the smallest prime number as well as the largest prime number, calculate their Greatest Common Divisor (GCD) and print it as the result.
Note: Suppose, if the two prime numbers does not exist in given range of X and Y, enable the user to enter the different range of X and Y which includes at least two prime numbers.
2. Construct a C program to find the Union and Intersection of two sets available in two one dimensional numerical arrays and print their result. Here, the Union of two sets A and B is the set of all those elements which are either in A or in B, whereas the Intersection of two sets A and B is the set of all elements which are common.
3. Using the concept of array of pointers in C, implement a program to sort and print the list of city names in ascending order with the two options such as (i) sorting by the alphabetical order of the city names (ii) sorting by the length of the city names.
4. An army camp is recruiting trainees by considering different parameters such as height, weight, age and chest measurement. The selection will be based on the following conditions.
-Age should be greater than 19 and less than 26
-Height should be between 5.0 to 6.0 inches
-Weight should be between 40 to 55 kg
-Chest should be greater than 42 cm
Devise the logic and develop the C code to find the number of persons got selected using the concept of structure. Print whether the person is fit to army or not. If not fit, print the reason for disqualification. The possible messages that can be given for disqualification are: Disqualified due to age, Disqualified due to height, Disqualified due to weight, and Disqualified due to chest. Finally, display the following information of the selected persons such as S. No, Name, Age, Height, Weight, Chest size and the selection Status (Selected / Not Selected).
5. Discuss the following:
 - a) Importance of "break" and "continue" statement. [3]
 - b) Compare and contrast the concepts of Call by Value, Call by Address and Call by Reference. [4]
 - c) Using static data members and static member functions, count the number of object created under a class. [3]
6. Using classes and object in C++, develop a program to read the set of time duration taken by the two individuals to complete the set of tasks (Ex.Task1 to Task5). Identify who is efficient in each of the task and in overall all of tasks by comparing the time taken to complete each of the task by individual and the overall time to complete all of the tasks respectively.

7. A business man deposited his huge money in his Saving Bank Account at State Bank of India and a Current Account in his City Union Bank. Surprisingly, Income Tax Department wants to identify the bank balance of the business man in different bank accounts. To enable the balance access, Banks allows a new common outside function with the name "Income_Tax_Checking" as the friend to know the balance in all the Bank's accounts and identify the total balance. Here, function with the name of "Income_Tax_Checking" is restricted to access only the balance and not to update the balance of Bank Accounts. Develop an object oriented program to implement the above scenario and print the total balance of the Business man.
8. By adopting the similar system followed in VIT to fix the course result, implement the following hybrid inheritance with the minimum data members and member functions. Assume, there are only two internal assessments called as CAT1 and CAT2 with the weightage of 25 marks each and Final Assessment Test (FAT) performance with the weightage of 50 marks. To assign the result as "Pass", Final Assessment Test (FAT) Performance should be more than 40% and the Overall Performance (CAT1 + CAT2 + FAT) should be more than 50%, otherwise, print the result as "Fail". Further, your implementation in C++ should display the result as "Pass" or "Fail" for the "n" students enrolled in a course.



9. a) Implement a C++ program to reverse the case of each alphabet in the given string by overloading the logical NOT operator i.e. !. [5]
 b) Consider the system of measuring the distance by feet and inches. Develop an OOP to create two Distance objects and compare them to produce the results between the Distance object as "Equal" or "Unequal" by overloading the equality operator. Here, define the operator function for "=" operator. [5]
10. Define class template called "Vector" which represents one-dimensional array. Use dynamic data member instead of arrays for storing vector elements. Incorporate the following function templates such as (i) Add two vector objects (ii) Return the mean (average) value of all elements in the Vector as part of the above class template. Finally create two Vector Objects with the float type and perform the addition. Also, find the mean value of another Vector Object which contains the double values.
11. a) Why should we avoid Multi-path Inheritance? When does it create the issue on its usage? How is it rectified in C++? Demonstrate it with suitable application. [5]
 b) When is it mandatory to use the concept of Abstract class, Nameless object and Class templates? Give an example. [5]
12. Develop an OOP to get the monthly income of Father and Son and check whether they are Tax Payer or not by incorporating the function "isTaxPayer()" in "Father" and "Son" class using virtual functions. Assume, if the person's yearly income is more than 2.5 Lakhs rupees, he become as the Tax Payer. Further, compare and contrast static binding and dynamic binding. How is it implemented in C++?

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