M/E/TX

Final Assessment Test – May 2024

VIT® Vellore Institute of Technology (Deemed to be University under section 3 of the UGC Act, 1956)

Course: BCSE102L - Structured and Object-Oriented Programming

Class NBR(s): 1126/1128/1130/1132/1135/1136/1138/ 1139/1141/1143/1145/1147/1149/1151/1153/1155/ 1157/1159 Slot: C1

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

General Instructions: Draw Diagrams Wherever Necessary.

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. a) Write a C program to calculate the parking charges as follows: [5]
   - Free if waiting-time is not more than 10 minutes.
   - It is Rs.40 for a 4 wheeler up to 2 hours and Rs.20 for 2 wheeler for up to 2 hours.
   - For more than 2 hours, waiting time is rounded up to the next hour and every additional hour is charged as Rs.20 for 4 wheeler and Rs.10 for a 2 wheeler.

   Get the in-time and out-time in hrs: min (in 24 hrs format) and then calculate the parking charges. Assume all vehicles parked are moving out of the mall on the same day. Use 'T' for two-wheeler and 'F' for four-wheeler identification.

   b) Compare and contrast while and do-while looping statements in C. Give suitable examples. [5]

2. a) Given the inputs N, A and S where integer N represents the size of the array, A represents an array of integers separated by space and S represents the sum. Write a C program to find all Triplets that produces the given sum in the given array. [5]

   Sample Input:
   N : 5
   A : 4 2 1 6 3
   S : 8
   Sample Output:
   4 1 3

   b) Write a C function to sort the letters in a given string in lexicographic order and print them. Write a driver code that gets input string from the user and passes the input string to that function as argument. [5]

3. Write a C program to create a 1D integer array dynamically and store rules in it. Write a function that uses pointers to find the second largest and second smallest element in the array. Also, write another function that uses pointers to search for a given element and returns the index of the element if the element is found, otherwise returns - 1.

4. Create a structure using C to store the student details like register number, name, marks in five subjects, total, average and grade. Read the register number, name, and marks in five subjects and calculate the total, average and grade obtained for 'n' students. Print the details of the students in the descending order of rank obtained.

5. Consider there are two structures "Employee" (inner structure) and "Organisation" (Outer structure). The structure "Organisation" has data members like org_name, org_number. The "Employee" structure has data members like emp_id, emp_name and salary. Illustrate the two different ways of accessing these data members of nested structures with a driver code.

6. Write a C program to count the frequency of each element of the given 2D integer array.

7. Create a class called "PunchInTime" with data members such as hours, minutes and seconds. Create a default constructor to get the user inputs for the above data members. Create another class called "PunchOutTime" with data members such as hours, minutes and seconds. Create a parameterized constructor to get the user inputs for the above data members. Create a friend function that finds the duration i.e. difference between punch out time and punch in time and displays the same in **hours:mins:secs** format. Write a C++ program to implement the above by passing objects as arguments to the friend function.

8. Assume that you are developing a banking application software.
   - Create a class named "**Bank**" with bank_balance, customer name, Account number, customer_balance and PAN number as data members.
   - Derive two classes such as "**CreditTransaction**" with a member named "deposit_amt" and "**DebitTransaction**" with a member named "withdraw_amt" from the "Bank" class.
   - Derive another class "**Transaction**" from **"CreditTransaction"** and **"DebitTransaction"** classes and define suitable methods to perform credit and debit operations and to display the bank_balance, customer_balance with the customer details.
   - You need to check whether the balance amount is sufficient or not while implementing the debit operation.
   - Remember, the bank_balance in the "Bank" class should be changed for every credit and debit transaction of every customer.

   Write a C++ code to implement the above scenario for 2 customers.

9. Define Inheritance. List the different types of inheritance and illustrate each of them with a suitable example.

10. You are working on a project to manage a library. You have a class called 'Book' that stores information about the book such as title, author and publication date. Write a C++ code to overload "<=" and ">=" operators to compare the books by their publication date. Also overload "==" operator to find the book requested by the user by checking the title of the book and display all the details of that book.

11. Stack is an array where elements can be inserted and deleted from only one end. Insertion and deletion are not allowed in between.
    Create a generic STACK class in C++ that performs the following operations on int, float, char and double data types.
    a) PUSH – inserting an element on to the top of the stack
    b) POP – popping out the top most element of the stack
    c) DISPLAY - the elements of the stack.

12. Write a C++ program to implement generic methods for the following operations.
    i. Finding the squares of 2 nos. of 3 different data types.
    ii. Reversing an array of 3 different data types.

⇔⇔⇔**M/E/TX**⇔⇔⇔