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Vellore Institute of Technology

Final Assessment Test – June 2023

Course: **BCSE102L - Structured and Object-Oriented Programming**
Class NBR(s): **6394 / 6396** Slot: **A2**
Time: **Three Hours** Max. Marks: **100**

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN "OFF" POSITION IS TREATED AS EXAM MALPRACTICE

Answer any TEN Questions
(10 X 10 = 100 Marks)

1. 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 18 and less than 25
   - Height should be between 5.2 to 5.6 inches
   - Weight should be between 45 to 60 kg
   - Chest should be greater than 45 cm

   Develop C code to find whether the person is fit to the army or not. Print the reason for disqualification otherwise. 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.

2. Suppose there are two players Amal and Bimal. They are playing a game. The game rules are as follows:
   - Both players have a same string s.
   - Both of them have to make substrings using the letters of s.
   - Bimal has to make words starting with consonants.
   - Amal has to make words starting with vowels.
   - The game will end when both players have made all possible substrings.

   Now the scoring criteria are like: a player gains 1 point for each occurrence of the substring in the string s. Find the winner of this game and his score by using an interactive C code.

3. Consider an array called arr, contains unique elements and also have another value k. Now consider a game where the task is to take first two elements of the array. In each turn, compare arr[0] with arr[1], and the larger value wins and remains at position 0 and the smaller value moves to the end of the array. This game will end when a value wins' k consecutive rounds. Write an interactive C code to find the winner from the array.

So, if the input is like arr = [1,5,6,3,4,2] and k = 3, then the output will be 6 because

- round 1, arr = [1,5,6,3,4,2], winner 5, win count for 5 is 1
- round 2, arr = [5,6,3,4,2,1], winner 6, win count for 6 is 1
- round 3, arr = [6,3,4,2,1,5], winner 6, win count for 6 is 2
- round 3, arr = [6,4,2,1,5,3], winner 6, win count for 6 is 3

So winner is 6 as it won three times (k = 3)

4. Devise a C code to find and print the largest double number entered by the user in a dynamically allocated memory.

5. Make a structure called Time that stores information about time intervals like seconds, minutes, and hours. In order to store two time periods in the structural variables t1 and t2, the user is asked to enter them. The main () function then displays the outcome of the compute_Time_Difference() function's calculation of the difference between the time periods. Create a C programme to calculate the difference between two times.

6. A software company sells a package that retails for $100. Quantity discount are given below.

   - 10% discount if purchase between 10 - 19 packages.
   - 20% discount if purchase between 20 - 49 packages.
   - 30% discount if purchase between 50 - 99 packages.
   - 40% discount if purchase 100 packages or more.

   Develop a C++ code using class and object creation to read the numbers of units purchased and computes the total cost of the purchase.

7. Assume you are attending an interview to a big dream company. In the technical round, the interviewers shoot out the question based on the characteristics that differentiate the Structured Oriented Programming and the Object Oriented Programming. What will be your explanation to the question so that your boss will immediately give you an appointment order?

8. Make a class student with the name and registration number of each student. Create a derived class marks using the data members' scores in six subjects. Make a non-member function compute that displays information about the student, such as the name, total and average of six subjects. Also display the grade for the student, assume

Avg. Marks	Grade
90 or more	S
80 - 89	A
79 - 60	B
Below 60	F

9. A shape base class should be created. To determine a shape's area and perimeter, use this class. Draw three distinct classes—square, rectangle and circle—from the fundamental shape. Create the member functions perimeter and area as pure virtual functions, then redefine them in the resulting classes.

10. For the purpose of storing the matrix information, create a class matrix with data members that include a 2D array, rows and columns. Functions for writing operations that read and display matrices are available. Addition, subtraction and multiplication functions for matrices should be defined as operator member functions.

11. Design a C++ programme to sort doubles and integers and show how to develop a template function for bubble sorting.

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