



VIT
Vellore Institute of Technology

(Autonomous University under Section 3 of UGC Act, 1956)

Continuous Assessment Test 2(CAT 2) – MAY 2023

Programme	: B.Tech. Computer Science and Engineering	Semester	: Winter Semester 2022-23
Course Code	: BCSE102L	Class Nbr(s)	: CS2022232300562 CH2022232300562 CH2022232300563 CH2022232300564 CH2022232300733 CH2022232300734 CH2022232300781
Course Title	: Structured and Object-Oriented Programming	Slot	: C2
Faculty(s)	: Dr. SUGANESHWARI G Dr. DHANALAKSHMI R Dr. SUSEELA S Dr. KIRUTHIKA S Dr. VATCHALA S Dr. DEEPA NIVETHIKA S Dr. SENDHIL R		
Time	: 90 Minutes	Max. Marks	: 50

Answer all the Questions

Q. No.	Sub-division	Question Text	Marks
1.		<p>Mr. Richard was travelling in a train. The train started from Chennai at 8 hours, 30 minutes and 30 seconds and reached Madurai at 18 hrs, 50 minutes and 40 seconds. (i.e) it took 10 hours, 20 minutes and 10 seconds to travel. Write a program using default arguments in C++ and calculate the arrival time with the departure being provided by the user. (Answer should be in 24:60:60 formats).</p>	10
2.		<p>Suppose you are working on a program that models a banking system. You are asked to create a class called Bank Account that represents a single bank account, with the following attributes:</p> <ul style="list-style-type: none"> • Account Number: an integer that represents the account number • Account Holder Name: a string that represents the name of the account holder • balance: a double that represents the current balance in the account <p>The Bank Account class should have the following public member</p>	10

	<p>functions:</p> <p>deposit: an inline function that takes an amount in double datatype and adds it to the balance in the account.</p> <p>withdraw: an inline function that takes an amount in double datatype and subtracts it from the balance in the account, if the account has sufficient funds. If the account does not have sufficient funds, it should print an error message and not update the balance.</p> <p>getBalance: an inline function that returns the current balance in the account.</p> <p>Write a C++ program in which, in the main function, create two Bank Account objects with different account numbers and account holder names, and initialize them with initial balances. Prompt the user to enter a deposit and a withdrawal amount for each account, and use the deposit and withdraw functions to update the balances accordingly. Finally, print out the current balances for both accounts.</p>	
	Suppose you are working on a program that manages a library's book collection. Each book is represented by information such as the book's title, author, and ISBN. Write a C function that takes an array of book details as a pointer, along with the number of books in the array, and returns the book title with the highest number of pages. Use appropriate functions to implement the functionality described above.	10
	<p>Sharma is building the student database to identify the best student based on the student academic records. He picked few numbers of 10 students with each student having a specific CGPA till the current semester. The CGPA varies from 7 to 10 and they are stored in a linear fashion. Identify the best student only based on the available 10 listed students. Use the mechanism of referencing and write a program in C language to print the roll no, CGPA of the student and reference (address) of the student record. Do this to print the CGPA of all the ten-student stored.</p> <p>Sample input: 7.2, 8.1, 8.3, 7.5, 9.5, 8.4, 7.4, 9.6, 9.2, 8.6</p> <p>Sample Output :Roll No: 1 ;CGPA: 7.2;Reference: 65183</p>	10
	<p>ATM machine that allows users to withdraw cash from their account. Each user account has account number, PIN, Balance. Represent this information using structure concept in C. A user wants to withdraw some amount from his account. Here's a scenario that you can implement using C.</p> <ul style="list-style-type: none"> • Prompt the user to enter the account number and PIN • Use the entered account number to look up the user's account details from a database or file • Verify that the entered PIN matches the PIN stored in the account details • Prompt the user to enter the amount they want to withdraw 	10

- Verify that the entered amount is less than or equal to the account balance
- Deduct the withdrawal amount from the account balance
- Update the account details in the database or file
- Dispense the cash to the user

You can implement the above scenario using the appropriate C programming concepts. The account for various users is to be created and stored. Hence use the structure concept and process the withdrawal amount using arithmetic operations.

Total

50

Continuous Assessment Test I- March/April 2023

B. Tech EGM & B.Tech. CSE	Structured and Object-Oriented Programming	Semester	Winter 2022-23
Dr. DAVITHRA S		Code	BCSE1021
Dr. SIVAKUMAR P		Slot(s)	G2+TG2
Dr. LAKSHMI PRIYAB		Class Nbr	CH2022232300717
90 Minutes		Max. Marks	50

Answer ALL the Questions

- 1 Mrs. Rose is a party planner; she decides to order flowers and balloons online. She orders Lotus, Roses, Sunflowers and Lilies; similarly, she orders Purple, Pink, Blue and Silver colour balloons. The cost of one flower, irrespective of the type, is 10 rupees, and the cost of one balloon, irrespective of the colour, is 15 rupees. Initialize the quantity for each flower and each balloon based on the user input. During payment, she sees that discounts are available based on some conditions given below: 10 marks

Condition	Discount
Total cost >500	15 % of the Total cost
500>=Total cost>300	10 % of the Total cost
300>=Total cost >100	5 % of the Total cost
Total cost <=100	No Discount

Write a C program to calculate the total cost and display the price after the discount. (7 Marks)

Write an algorithm to explain the logic of this system. (3 Marks)

- 2 Rahul saves Rs.100/- every month in a savings account of the bank with an annual interest rate of x%. For example, if the annual interest rate is 5%, the monthly interest rate is $0.05/12 = 0.00417$. After the first month, the amount in the account becomes

$$100 * (1 + 0.00417) = \text{Rs.}100.417 \quad \# \text{ I represent First Month}$$

After the second month, the amount in the account becomes

$$(100 + 100.417) * (1 + 0.00417) = 201.35$$

And so on

At the end of every month, Rahul wants to check his total savings as on date. Help Rahul with a C program to display his savings from first month till date. Get the number of months and annual interest rate as input from the user and display the total

Savings at the end of every month. (7 Marks)

Depict the flowchart to explain the logic of this system. (3 Marks)

3. Write a C program to create and get inputs for arrays $a[m][n]$ and $b[p][q]$. Perform the following operations. 10 marks

- Compute the sum of major diagonal elements and minor diagonal elements separately for the array $b[p][q]$ and display it (5 Marks)
- Display the lower triangular matrix for array $a[m][n]$. (5 Marks)

4. The Government of India is organizing National Cadet Corps (NCC) selection at university. The university management sent a circular to all the notice boards with the details like students have to assemble in the football ground. The officials on the ground will select students based on their heights. Write a C program to get "k" number of students and their heights as "p" in an array to arrange students in ascending order based on height. Use function to arrange 'k' students based on their height. 10 marks

An android App accepts only numerical password.

The constraints in setting the password are

- i. The password should be of length 4 to 6 digits
- ii. The password should a palindrome number.

A palindrome number is a number that remains the same even when it is reversed.

Write a C program using function to check whether the password set by the user is valid or not. Throw an error message as Invalid Password, If the password entered by user is not a palindrome and also length of the password should be 4 to 6 digits. Prompt the user to enter a new password until the user enters a valid password.

**VIT**Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)**Continuous Assessment Test II (CAT II) – May 2023**

Programme	B.Tech. Computer Science and Engineering	Semester	: Winter Semester 2022-23
Course Code	BCSE102L	Class Nbr(s)	: CH2022232300780 CH2022232300566
Course Title	Structured and Object-Oriented Programming		: CH2022232300569 CH2022232300567 CH2022232300735 CH2022232300568 CH2022232300782 CH2022232300725
Faculty(s)	: Dr.A.Menaka Pushpa Dr.Vatchala .S Dr. S. Pavithra Dr.Ilavendhan .A Prof.R.Sujithra Dr. D. Sathian Dr. T. Raja Sree Dr. Christopher Columbus C	Slot	: C2
Time	: 90 Minutes	Max. Marks	: 50

Answer all the Questions

Q. No.	Sub-division	Question Text	Marks
1.		Jack is a sports teacher at St. Patrick's School. He makes games not only to make the student fit but So smart. So, he lined up all the N number classes of students in his class. At each position, he has fixed a board with the Integer number printed on it. Each number is unique and in exactly the range of N. Let us say there are 10 students, then the boards will be printed with numbers from 1 to 10 in a random order given by the sequence A[]. As a rule, all students wear a jersey with their numbers printed on it. So if there are students, each will have a unique jersey number just like a football team. Now, in the beginning, all the students will stand as per the increasing order of their jersey numbers, from left to right. The only difference will be their respective board number which is placed at their respective location. The board location is fixed and cannot be changed.	10
2.		Write a C program to manage a parking lot for the following scenario. You want to keep track of the number of available parking spots, as well as the	

	<p>license plates of the cars parked in each spot.</p> <p>You decide to represent the parking lot as an array of strings, where each string corresponds to a parking spot and contains either the license plate number of the car parked there or an empty string if the spot is available.</p> <p>To keep track of the number of available parking spots, you decide to use a pointer to the first empty spot in the array. Whenever a car leaves the parking lot, you update the array to remove its license plate and increment the pointer to point to the next empty spot. Whenever a car enters the parking lot, you insert its license plate at the current location of the pointer and increment the pointer to point to the next empty spot. Suppose the parking lot is initially empty and you have a pointer <i>p</i> that points to the first element of the array.</p> <p>What happens if you try to insert a car into the parking lot when <i>p</i> is pointing to the last element of the array? How would you handle this situation?</p>	10
3.	<p>Consider this scenario, now you are working as a software developer in a mobile app development company. Your team has been assigned to develop a mobile app for a new startup. The client wants to keep track of the app's features, bugs, and the team working on each task. You have decided to use a C program using structure with an array to manage the app development process. Create a function to read all App Store and write sample output for the following scenario.</p> <p>Example:</p> <p>===== App Store =====</p> <ol style="list-style-type: none"> 1. Add an app 2. View all apps 3. Search for an app 4. Exit <p>Enter your choice: 1</p> <p>Enter app name: quatumbid</p> <p>Enter app developer :Quad</p> <p>Enter app category :software</p> <p>Enter app price: 25000</p>	10
4.	<p>Create a program to model a banking system. You have a <i>BankAccount</i> class that stores information about each account, including the account holder's name, account number, and balance. You want to add a function to the class that allows account holders to transfer money to another account, but you need to access the private member variables of two <i>BankAccount</i> objects to do so.</p> <p>Write a C++ program that implements a <i>transferMoney()</i> function as a friend function of the <i>BankAccount</i> class. The <i>transferMoney()</i> function should take two <i>BankAccount</i> objects as arguments and transfer a specified amount of money from the first account to the second account. Make sure to include</p>	10

		appropriate member functions in the BankAccount class to store and retrieve account information. Also, make sure to handle cases where the transfer amount exceeds the balance of the first account or where the account numbers are invalid.	
5.		<p>Write a C++ program utilizing constructors and destructors to manipulate an array of non-negative integers, ‘arr’, by cyclically shifting its elements to the right by k positions. For instance, given an input array $\text{arr} = [1,2,3,4,5,6,7]$ and a shift value $k = 3$, the program should output the transformed array $[5,6,7,1,2,3,4]$. If shift value $k = 1$, then the output should be $[7,1,2,3,4,5,6]$. Illustrate the working of the algorithm and provide comments with explanation for the code.</p> <p>Note: The input array should be passed to the constructor of the “ShiftArray” class from the main function.</p>	10
Total			50



**VIT**

Vellore Institute of Technology

Chennai - 600 022 University under section 3 of UGC Act, 1956

Continuous Assessment Test II – May 2023

Programme	B.Tech. (SCOPE)	Semester	Winter 2022-23
Course	Structured and Object-Oriented Programming	Code	BCSE102L
Faculty	Dr. DEEPA NIVETHIKA Dr. AKHIL KUMAR Dr. MENAKA PUSHPA A Dr. T RAJA SREE Prof. SUJITHRA @ KANMANI R Dr. VIJAYAPRABAKARAN K Dr. VALLIDEVI K	Slot(s)	G2
Class Nbr		Class	CH2022232300544
			CH2022232300546
			CH2022232300547
			CH2022232300548
			CH2022232300549
			CH2022232300551
			CH2022232300552
Time	90 Minutes	Max. Marks	50

Answer ALL the Questions

1	An IT company has N cabins and N employees. Initially, all cabins are closed. As the employees enter, the first employee opens every cabin. Then the second employee enters, he begins with the second cabin and closes every second cabin. The third employee begins with the third cabin and changes every third cabin (closes the cabin if it is open and opens the cabin if it is closed). Fourth employee begins with the fourth cabin and changes every fourth cabin. Fifth employee begins with fifth cabin and changes every fifth cabin and so on until employee N changes the cabin N. After all the employees have passed through the building and changed the cabins, the cabins which are opened are to be identified. With the help of pointers in C program, identify how many cabins are opened and print all the opened cabins. Get the value of N from user.	10 marks
2	In an e-book, a 3 letters word is to be searched for its number of occurrences. Write a C program using memory allocation and multiple pointers concepts. It should be in such a way that a sentence comprises 3 words, a paragraph comprises 3 sentences, a page comprises 3 paragraphs, A chapter 3 pages and a book comprises 3 chapters. word sentence = word*3 = 1*3 = 3 paragraph = sentence*3 = 3*3 = 9 pages = paragraph*3 = 9*3 = 27 chapter = pages*3 = 27*3 = 81 book = chapter*3 = 81*3 = 243	10 marks

3	<p>Consider the following scenario to write a code in C: the company XXX wants to integrate two banks namely HFLC and IFIFI banks into their shopping cart so that their customers can initiate payment through HFLC or IFIFI bank. Since the company XXX does not possess its own bank, XXX needs to implement the required functions from these banks to perform customers' transactions. Create a function (HFLC and IFIFI) with transaction details such as the name of the bank, account balance, and product price. Create a structure for the company XXX that implements both the functions to perform the transactions and reflects the total amount added to XXX's account and the remaining balance in the customer's account. If the customer's bank is not listed by XXX then you should return as error.</p>	10 marks
4	<p>Assume you are developing an online warehouse management system, when a new customer is sending a query to the system, based on the availability, the system will allocate the space or it will return "not available".</p> <p>Create a class for the customer with data members; customer name, requirement of space (length and Breadth in meters) and number of days required. The member function set_data will get the input from the user and initialize the member variables and generate_quotation function will display the quotation for the requirement. The rent of one square meter space for one day is Rs. 50/-.</p> <p>Create the static data member company name, available space (in meters) and define the static function named avail_space() to check the availability of calculated required space in the warehouse by checking the status of 'available space'. Write the C++ program to implement the above scenario and generate the quotation for the requirement.</p>	10 marks
5	<p>Write a C++ program to implement the automobile dealership system. This system consists of two classes Sales Manager and General Manager. The Sales Manager maintains his customers' namelist, number of customers and performance status. This class has set and get methods for data members' values assignment and display. Assume that the Sales Manager can deal 'N' number of customers. Whenever the Sales Manager sells a car to new customer then this customer name is added in the name list and the number of customer is also increased. The General Manager class has a method to evaluate the performance of Sales Manager based on the number of customers he has and set Sales Manager's performance status as Good if the number of customers is more than 100 otherwise set 'Improvement Needed'. This system also supports the lucky winner function to find the customer with eight letters in his name to announce the winner's name. Winner function should be declared as a friend function. Apply friend function and friend class concepts to implement this system.</p>	10 marks

***** END *****

Continuous Assessment Test 2 – May 2023

Programme	B.TECH (SCOPE)	Semester	Winter 2022-23
Course Title	Structured and Object-Oriented Programming	Code	BCSE102L
Faculty	Dr. R. Sendhil Dr. Vijayaprabakaran K Dr. Ilavendhan A Dr. Vallidevi K Dr. S Jahangeer Sidiq Dr. Elakiya E Dr. Palani Thanaraj K	Slot	G1
Duration	1 hour 30 mins	Max. Marks	50

Answer all the Questions

Ques. No.	Sub sec	Question Description	Marks
1.		<p>Suppose you have to store the marks obtained by the students of your class using the concept of arrays in C language. Create a pointer to integer which:</p> <ul style="list-style-type: none"> a) displays the <u>marks</u> obtained by each student. (3 marks) b) displays the base addresses of the individual elements of the array. (3marks) c) display the <u>minimum</u> and <u>maximum</u> marks obtained in the class. (4 marks) 	[10]
2.		<p>Imagine you are an embedded engineer working on a camera system. The system needs to be able to rotate snapped images by 90 degrees clockwise. One way to implement this feature is by representing the image as a matrix of pixel values and using matrix manipulation techniques to rotate the image.</p> <p>For example, let's say we have a 5x5 image represented as a matrix of pixel values:</p> <pre> 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 </pre> <p>The rotated image should look like this:</p> <pre> 21 16 11 6 1 22 17 12 7 2 23 18 13 8 3 24 19 14 9 4 25 20 15 10 5 </pre> <p>Develop a C program to perform the image rotation operation. Also, keep in mind that the camera system has very less memory and requires space for other camera operations as well. So, develop an efficient program with a dynamic memory allocation method.</p>	[10]

3.	<p>Write a C program that allows the user to perform the following three operations using a heterogenous record named "employee":</p> <ul style="list-style-type: none"> (a) Add employee details: The program should ask the user to enter the details of 'n' employees such as employee number, name and salary, and store them in an array of structures. The number of employees to be entered should be specified by the user. (3marks) (b) Find the highest salary employee: The program should find the employee with the highest salary and display the employee number, name, and salary. (3 marks) (c) Update employee details: The program should allow the user to update the details of an employee, given the employee number. (4 marks) <p>The program should present the user with a menu of options and allow them to choose an option. After performing the selected operation, the program should return to the menu until the user chooses to exit.</p>	[10]
4.	<p>Develop a C++ program that manages the information of students in a school. Create a Student class that contains private member variables such as name, Id, and marks. Write a friend function to access the private members of the Student class to calculate the total and average marks of each student.</p> <p>Using parameterized constructor, the object of the Student class is created for N number of students.</p> <p>Assume the class consists of 3 students with the following student data:</p> <p>Student ID 1: Name: Alice, Marks: 75, 82, 85 Student ID 2: Name: Bob, Marks: 85, 90, 95 Student ID 3: Name: Charlie, Marks: 60, 70, 80</p>	[10]
5.	<p>Suppose there are 2 persons whose height is measured in terms of feet and inches. Write a C++ program that finds the sum of the heights of two persons in terms of feet and inches. If inches in the result exceeds 12 it must be converted into feet. One Feet is equivalent to 12 inches. Make use of Class with fields as feet and inches in it for storing the individual's height and a parameterized constructor with two arguments for assigning the feet and inches in the two objects created. And a method sum() that finds the sum of the heights of two persons and prints it.</p>	[10]

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Course Code & Course Title	: BCSE102L - Structured and Object-Oriented Programming	Semester	: Winter 2023-2024
Faculty	: Dr. JAYASUDHA M, Dr. THOMAS ABRAHAM J V, Dr. INDRA PRIYADHARSHINI, Dr. SUGUNA, Dr. MANORANJITHAM M, Dr. SELLAM V, Prof. PAVITHRA L	Slot	: E1
Duration	: 1 Hour 30 Mins	Class Number	: CH2023240500965, CH2023240501292, CH2023240501280, CH2023240501283, CH2023240501310, CH2023240501278, CH2023240501298
		Max. Mark	: 50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
X		<p>In structural engineering, analyzing the load on beams is crucial for designing safe and efficient structures. A beam may support multiple point loads and distributed loads. Point loads act at a single point, whereas distributed loads are spread out across a section of the beam.</p> <p>Create a C program to help engineers analyze beam loads. Your program should be able to calculate the total load on a beam and the load at specific points along the beam. The program should use structures to represent point loads and distributed loads, and it should dynamically allocate memory to store the loads entered by the user. Your program should include a function to calculate the total load on the beam. This includes summing up all point loads and integrating the distributed loads over their active lengths. The point load is equal to the magnitude applied at the specific point. Total point load is the sum of the magnitudes of all point loads.</p>	10
2.		<p>Create a class 'Person' with five data members which are First name, Middle name, Last Name, age and address of students.</p> <ul style="list-style-type: none"> • The constructor of the class assigns default values to name as "unknown", age as '-1' and address as "not available". • The parameterized constructor of the class assigns to age as '18'. • The parameterized constructor of the class assigns to name as "Jaya", age as '21'. • The parameterized constructor of the class assigns to name as "Prabhu Deva", age as '25'. • The parameterized constructor of the class assigns to name as "Pallav Raj Thareja", age as '32' and address as "VIT" 	10

University, Chennai".
Write a C++ program for the display function to print the name, age and address of students.

Design a C++ program utilizing friend functions and static member functions to manage employee data and sales performance. The program comprises two classes: "Employee" and "Sales". The Employee class is tasked with reading and printing employee information, encompassing the employee's name, ID, department, and monthly salary. On the other hand, the Sales Class reads and prints employee details, calculates incentives based on sales performance, and assigns performance indicators to employees based on their total sales in a month.

a) The Sales class computes incentives acquired by employees based on monthly sales:

10% of the monthly salary if units sold range between [50 and 100]

20% of the monthly salary if units sold fall between [101 and 150]

30% of the monthly salary if more than [150 units are sold.]

b) The Sales class assigns performance indicators to employees according to their total sales in a month, adhering to the following criteria:

Sales above 150: Excellent

Sales between 101 and 150: Good

Sales ranging from 50 to 100: Satisfactory

Sales below 50: Poor.

Write the main() function to implement the friend class and execute the necessary operations.[5+5 Marks]

10

Create a system to model different types of fruits, with a focus on mangoes, specifically the Alphonso variety. Each type of mango possesses distinct attributes and behaviors. To enhance organizational efficiency, we have opted to utilize inheritance in our design.

Design classes using following structure

1. **Fruit:** Serve as the base class defining general attributes and methods for fruits. It should include properties like name and color.
2. **TropicalFruit:** Derived from Fruit, include characteristics specific to tropical fruits such as growing region and availability.
3. **Mango:** Extend from TropicalFruit, introduce properties unique to mangoes such as sweetness level and origin.
4. **AlphonsoMango:** Further specialize in a specific variety of mango, inheriting properties from Mango while adding distinct features of Alphonso mangoes like aroma and texture.

10

Each class should integrate suitable constructors for

	<p>obtaining user input and assigning it to their respective attributes. Additionally, ensure the presence of display methods to print the details. Get number of objects 'N' to be created from user. Based on the input given create object array of size 'N'.</p> <p>a) Identify the type of inheritance and provide a schematic representation of it (2 marks)</p> <p>b) Do C++ implementation of the above problem (8 marks)</p>	
5	<p>Design a C++ gaming app with <u>Warriors</u>, <u>Mages</u>, <u>and</u> <u>Archers</u> using hierarchical inheritance. Create a <u>base class Character</u> with member variables name and health, along with member functions for displaying character info. Derive classes <u>Warrior</u>, <u>Mage</u>, and <u>Archer</u> from <u>Character</u>, each with unique abilities implemented in member functions: <u>Warrior</u> with <u>attack()</u>, <u>Mage</u> with <u>cast Spell()</u>, and <u>Archer</u> with <u>shoot Arrow()</u>. Show character interactions in the main function to demonstrate inheritance's effectiveness in modelling diverse character types in a gaming context.</p>	10

*****All the best*****



Continuous Assessment Test(CAT) – II - APRIL 2024

Programme	: B.Tech(BCE, BRS, BAI, BDS, BLC)	Semester	: Winter 2023-2024
Course Code & Course Title	: BCSE102L - Structured and Object-Oriented Programming	Slot	: B2
Faculty	: Dr.Mansoor Hussain D Dr.Amutha S Dr. Indra Priyadarshini Dr.Suguna Prof.Balaji V Prof. Rajathi C Dr.Prabha B Dr. Manas Ranjan Prusty Dr.J.Uma Maheswari	Class Number	: CH2023240501318 CH2023240501320 CH2023240501322 CH2023240501325 CH2023240501328 CH2023240501332 CH2023240501340 CH2023240501349 CH2023240501378
Duration	: 1 Hour 30 Mins	Max. Mark	: 50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
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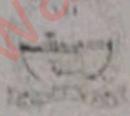
Answer all questions

Q. No	Sub Sec.	Description	Marks
1.		<p>Design a Super Market Billing system using Structures in C Programming. Store the details of a Bill (Bill number, Total Bill Amount, Customer Details, No of Products, Product Details) using a structure. To store the details of Customer (Customer ID, Name, Address, Phone Number) and Product (Product ID, Name, Price, Qty) use separate structures within the Bill structure.</p> <p>A customer can buy multiple products. Perform each of the following operations using a separate user-defined function. Let the required functions take the structure variable as argument.</p> <p>Use pointers to access the structure and allocate the memory dynamically. (1mark)</p> <ol style="list-style-type: none"> 1) Read the necessary input details of the bill for customer1 and customer2 (2 marks) 2) Display the bill of customer1 with his details and all the product details including amount of each product along with bill number and total bill amount. (2 marks) 3) Display the details of the costliest and the cheapest product bought from the customer1 bill. (3 marks) 4) Sum up the total bill amount of both the customers and display their bill details along with the sum. (2 marks) 	10
2.		<p>A CD shop is selling CDs related to all <u>genres of music</u>. As a manager of this shop your task is to maintain the CD details such as <u>name or title of the CD</u>, <u>composer name</u>, <u>music genre</u>, <u>price</u> and <u>stocks available</u> (<u>no of available CDs</u>). Whenever the customer wants a CD, the salesperson inputs the title and composer name of that CD and the system searches the list and</p>	10

	<p>displays whether it is available or not. If it is not available, an appropriate message should be displayed. If it is there then the system should display all the details about that particular CD and request the user to enter the number of CDs required. If the requested number of CDs are available, the total cost for the requested number of CDs should be displayed otherwise display the message saying "The requested copies are not in stock".</p> <p>Write a C++ program to implement the same with suitable member functions, constructors, and destructors. You need to create 'n' objects for the class CD. Use the default constructor to initialize the price of all CDs to 0. Use input() member function to get the CD details from the user. Create a destructor in such a way that it should depict the order of object destruction in the form of message saying "CD title(display appropriate title of CD)" is deleted. Suggest any member function of your class can be made as an inline function. Justify your answer.</p>	
3.	<p>As a volunteer with a local non-governmental organization (NGO) engaged in community initiatives, you have been entrusted with the responsibility to support the NGO's analysis of voting data obtained from Voter Verifiable Paper Audit Trail (VVPAT) systems used in a recent election. Your task involves developing a C++ program to aid the NGO in conducting this analysis. Design a class called Voter to represent individual voters, fulfilling the following requirements:</p> <p>1. Implement constructor overloading to initialize Voter objects with different sets of parameters (5 Marks):</p> <ul style="list-style-type: none"> • Constructor 1: Accepts the voter's name and age as parameters • Constructor 2: Accepts the voter's name, age, and their voting status as parameters (whether they have voted or not). <p>2. Develop a function named displayEligibleVoters() outside the Voter class. Let this function be a non-member of the Voter class but has to access the class's private members. This function should (5 Marks):</p> <ul style="list-style-type: none"> • Take multiple Voter objects as input. • Display the names of eligible voters who are above 18 years old and have not voted. 	10
4.	<p>A fitness app tracks the fitness of person by "Yoga" class with <u>yoga_duration</u> and "Exercise" class with <u>exercise_type</u> and <u>exercise_time</u>. By performing "Yoga" and "Exercise", the fitness condition is evaluated using the class "Fit" with <u>healthreport()</u> method using the following conditions:</p> <ol style="list-style-type: none"> If <u>exercise_time</u>>30minutes, <u>exercise_type</u>=running, and <u>yoga_duration</u>>=15minutes then fitness is good. If <u>exercise_time</u><=30minutes to >10minutes, <u>exercise_type</u>=running, and <u>yoga_duration</u><15minutes to >=10minutes then fitness is average. Otherwise fitness is bad. <p>"Meditation" class with property <u>Meditation duration</u> which is inherited from "Yoga". Use member function in <u>Meditation</u></p>	10

	<p>class to find the Meditation nature of a person by the following conditions:</p> <ul style="list-style-type: none"> i. If $yoga_duration \geq 15\text{minutes}$ and $Meditation_duration \geq 2\text{hours}$ to $\leq 3\text{hours}$ then the nature of meditation is good. ii. If $yoga_duration < 15\text{minutes}$ to $\geq 7\text{minutes}$ and $Meditation_duration < 2\text{hour}$ to $\geq 1\text{hours}$ then nature of meditation is average. iii. Otherwise nature of meditation is bad. <p>Develop a C++ program to implement the given scenario.</p>	
5	<p>Imagine you are designing a <u>software system</u> for a university that manages information about <u>faculty, staff, and students</u>. Each category has common attributes like <u>name, age, and address</u> which are declared in person class. Faculty, staff, and student classes have specific attributes unique to their roles. For example, faculty members have a department they belong to, staff members have a <u>designation</u> like "clerk" or "technician" and students have a field of study and a student ID.</p> <p>Use <u>appropriate inheritance</u> in C++ programming and design a system that represents these entities with appropriate attributes and methods. Ensure that <u>common attributes and methods are inherited from a base class</u>, while each specific category inherits from the base class and adds its unique attributes and methods. Additionally, provide functionality to input and display information for each entity type. Include member functions for the following operations:</p> <ul style="list-style-type: none"> i. Input information for faculty, staff, and students (2 Marks). ii. Display information for faculty, staff, and students. (2 Marks) iii. Process university details, such as calculating the average age of faculty/staff/students, listing all members of a particular department, and listing all students in a given field of study(6 Marks). 	10

*****All the best*****



Continuous Assessment Test (CAT) – II - April 2024

Programme	SCOPE	Semester	WINTER 23-24
Course Code & Course Title	BCSE102L Structured and Object Oriented Programming	Class Number	CH2023240501321 CH2023240501317 CH2023240501319 CH2023240501327 CH2023240501324 CH2023240501348 CH2023240501335 CH2023240501330 CH2023240501376 CH2023240503343
Faculty	Dr. Valarmathi P, Dr. Mansoor Hussain D, Dr. Amutha S, Dr. Yogesh C, Prof. Prethija G Prof. Deepika R Prof. Shree Prakash Prof. Safiya Parvin A Dr. Kavi Priya G Prof. Johnsi R	Slot	B1
Duration	90 Minutes	Max. Mark	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1		<p>Assume that your task is to develop an application for an Event Management System to help a company to handle events efficiently. The application will manage event details such as name, type, duration, expenses, and scheduled date. Implement the following functionalities using dynamic memory allocation in C:</p> <p>Create an array of Events: Define a structure named “Event” containing members such as name(string), type(string), duration(int), expenses(float), and a nested structure for the scheduled date. Create a structure named “Date” with three members i.e., day (int), month (string), year(int). Use dynamic memory allocation to create an array of events and prompt the user to input details for each event. (6 marks)</p>	6
2		<p>Write a C++ program with a class “BankAccount” which performs constructor overloading. Data members of this class are accountholder_name, account_number and initialbalance.</p> <ul style="list-style-type: none"> • Create a default constructor, which initialize the values to the account holder name as “unknown”, account number as 	10

	<p>• "00000000" and initialbalance as 0.0</p> <ul style="list-style-type: none"> • Create two parameterised constructors: one with the account holder name and initial balance as parameter, one with the account holder name, account_number and initial balance as parameters. • Use two member functions for deposit and withdrawal of money with one argument which is the amount to be deposited or withdrawn. Before performing the withdrawal process, the balance amount should be checked. <p>Now display account_holder_name, account_number and the initial balance for three accounts.</p> <p>Note: account1, account2 and account3 are the three accounts. account2 tries to withdraw more than the available balance for which "insufficient balance" alert is generated.</p>	
3	<p>Write a C++ program for a student record management system comprising two classes: Student and StudentRecords.</p> <p>The Student class represents individual student information and contains data members such as name, ID, and GPA. Utilize a parameterized constructor to instantiate three distinct objects of the Student class with the specified data members. Ensure that whenever a new student object is created, it updates the corresponding records in the StudentRecords class.</p> <p>The StudentRecords class manages the collection of student records. It contains static member variables totalStudents and totalGPA to track the total number of students and the total GPA sum. Additionally, include static member functions:</p> <ul style="list-style-type: none"> • getTotalStudents() : Retrieves the total number of students. • addStudent() : Adds a new student to the records, updating the total number of students and the total GPA sum accordingly. • calculateAverageGPA(): Calculates and returns the average GPA of all students in the records. <p>Implement a friend function checkPassFail() to determine whether a student has passed or failed based on their GPA. The condition for passing is $GPA > 2.0$; otherwise, the student fails. It should output a message indicating whether the student has passed or failed, along with their name and GPA.</p>	14
4	<p>An Inventory Management System has classes such as Product, Discountable. The Product class should encapsulate attributes like product_name, product_price, and quantity, complemented by methods such as getName(), getPrice(), and getQuantity(). Discountable class to handle items eligible for discounts, featuring a discountrate attribute and a getDiscountAmount() method to compute discounts based on product_price and discountrate.</p> <p>Finally, design a DiscountedProduct class that inherits from both Product and Discountable. This class should calculate and display the discounted price, utilizing the product_price from the Product class and the discountrate from the Discountable class. Create an object for DiscountedProduct which takes product_name, product_price, quantity and discountrate as parameters. Now display the product name,</p>	10

	<p>product price, discounted price and quantity using the same instance created for DiscountedProduct.</p> <p>An educational institute wants to assess their employees performance in three categories: Academics, Research, and collaboration with foreign universities. A class-named employee maintains an employee id and name. The academic class maintains the total years of experience. The research class has a numerical member named hindex. Collaboration class maintains the number of foreign universities the employee currently working. Gradepoint class is the derived class that calculate the total grade points(GP) for the employee from all the three classes.</p>	
5	<p>The constraints to be followed:</p> <p>If $\text{experience} < 5$ then $\text{GP1} = 0$</p> <p>If $5 \leq \text{experience} \leq 10$ then $\text{GP1} = 5$</p> <p>If $\text{experience} > 10$ $\text{GP1} = 10$</p> <p>If $\text{hindex} > 10$ then $\text{GP2} = 50$</p> <p>If $5 \leq \text{hindex} \leq 10$ then $\text{GP2} = 25$</p> <p>If $1 \leq \text{hindex} \leq 5$ $\text{GP2} = 10$</p> <p>Below 1 $\text{GP2} = 0$</p> <p>If $\text{nou} > 10$ then $\text{GP3} = 25$</p> <p>If $5 \leq \text{nou} \leq 10$ then $\text{GP3} = 10$</p> <p>If $1 \leq \text{nou} \leq 5$ $\text{GP3} = 5$</p> <p>Below 1 $\text{GP3} = 0$</p> <p>For the above scenario, apply the relevant object-oriented programming concept and write the code in C++.</p>	10

***** All the best *****