

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

Department of Information Technology

Session: 2023-24

Scenario Based Programs

Course :-	Object Oriented Programming
Course Code:-	IT403T
Semester/ Section/Branch: -	4 th Sem IT
Name of Faculty :-	Prof.Jagdish F. Pimple

Program No	Program Statement
1	<p>You are tasked with developing a C++ program that calculates the electricity bill for a residential customer based on the usage of electricity in kilowatt-hours (kWh) for the current month.</p> <p>The program should include a function named calculateElectricityBill that takes the total units consumed as an argument and returns the corresponding electricity bill. The billing rates are as follows:</p> <ul style="list-style-type: none">• For the first 100 units: \$0.50 per unit• For the next 200 units: \$0.75 per unit• For any additional units: \$1.20 per unit <p>The program should prompt the user to enter the total units consumed during the current month. After receiving the input, the program should call the calculateElectricityBill function to compute the bill amount and then display the result.</p>
2	<p>Create the class <code>student</code>, consider the data members for the class, write two function <code>get data</code> and <code>put data</code> for taking the input and Display the data of 10 student on the monitor screen using array of object concept</p>
3	<p>Program Statement: Area Calculator</p> <p>You are required to develop a C++ program that utilizes the concept of classes and objects to calculate the area of various geometric shapes, including a triangle, square, and circle.</p> <ol style="list-style-type: none">1. Create a class named Geometry with the following public member functions:<ul style="list-style-type: none">• calculateTriangleArea: Takes the base and height of a triangle as arguments and returns the area.• calculateSquareArea: Takes the side length of a square as an argument and returns the area.• calculateCircleArea: Takes the radius of a circle as an argument and returns the area.2. Implement the class methods to perform the necessary calculations for each geometric shape.3. In the main function, create an object of the Geometry class.4. Prompt the user to choose a shape (triangle, square, or circle) and input the required parameters (base and height for a triangle, side length for a square, and radius for a circle).5. Use the appropriate method of the Geometry object to calculate the area based on the user's choice and input.6. Display the calculated area with a meaningful message.

4	<p>Program Statement: Employee Salary Calculator</p> <p>You are tasked with developing a C++ program that utilizes classes and objects to calculate the net salary of an employee based on the following criteria:</p> <ol style="list-style-type: none"> Create a class named Employee with the following private member variables: <ul style="list-style-type: none"> basicSalary: Represents the basic salary of the employee. allowances: Represents the total allowances received by the employee. deductions: Represents the total deductions from the salary. Implement public member functions: <ul style="list-style-type: none"> setBasicSalary: Takes the basic salary as an argument and sets the value. setAllowances: Takes the total allowances as an argument and sets the value. setDeductions: Takes the total deductions as an argument and sets the value. calculateNetSalary: Calculates the net salary using the formula netSalary = basicSalary + allowances - deductions. In the main function, create an object of the Employee class. Prompt the user to input the basic salary, total allowances, and total deductions for the employee. Use the appropriate member functions to set the values. Call the calculateNetSalary function to compute the net salary. Display the calculated net salary with a meaningful message.
5	Write a C++ program using function with argument to sort the data element in ascending order
6	Write a C++ program to demonstrate the use of constructor and destructor Print the names of Students by creating a Student class. If no name is passed while creating an object of Student class, then the name should be "Unknown", otherwise the name should be equal to the String value passed while creating an object of Student class in C++
7	Construct the C++ code using classes & objects with the concept of array with an object. create a class library having the data are book name, book price, & volume. Create the member function get book details and display book details for getting the book details as a input and displaying the details on monitor screen. create the object of library class for getting the details of multiple books. Similarly display the total books volume available in library.
8	Write a C++ program to print name of student by creating a student class. If no name is passed while creating an object of the student class, then the name should be "unknown" otherwise the name should be equal to the string value passed while creating the object of the student class.
9	<p>Create a class named 'Rectangle' with two data members- length and breadth and a method to calculate the area which is 'length*breadth'. The class has three constructors which are :</p> <ul style="list-style-type: none"> - having no parameter - values of both length and breadth are assigned zero. - having two numbers as parameters - the two numbers are assigned as length and breadth respectively. - having one number as parameter - both length and breadth are assigned that number.
10	<p>Suppose you have a Piggie Bank with an initial amount of \$50 and you have to add some more amount to it. Create a class 'Add Amount' with a data member named 'amount' with an initial value of \$50. Now make two constructors of this class as follows:</p> <ul style="list-style-type: none"> - without any parameter - no amount will be added to the Piggie Bank 2- having a parameter which is the amount that will be added to Piggie Bank <p>Create object of the 'Add Amount' class and display the final amount in Piggie Bank.</p>

11	<p>Create a class named 'Programming'. While creating an object of the class, if nothing is passed to it, then the message "I love programming languages" should be printed. If some String is passed to it, then in place of "programming languages" the name of that String variable should be printed. For example, while creating the object if we pass "CPP", then "I love CPP" should be printed.</p>
12	<p>Program Statement: Area Calculator Class</p> <p>You are required to construct a C++ class named CalculateArea that encapsulates the functionality to calculate the area of geometric shapes, including a triangle, rectangle, and circle. The class should contain an overloaded member function named area to handle the calculations for each shape.</p> <ol style="list-style-type: none"> Create a class named CalculateArea with the following private member variables: <ul style="list-style-type: none"> base and height: Variables to represent the base and height of a triangle. length and width: Variables to represent the length and width of a rectangle. radius: Variable to represent the radius of a circle. Implement public member functions: <ul style="list-style-type: none"> setTriangle: Takes the base and height of a triangle as arguments and sets the values. setRectangle: Takes the length and width of a rectangle as arguments and sets the values. setCircle: Takes the radius of a circle as an argument and sets the value. area: Overloaded member function that calculates and returns the area based on the shape specified. In the main function, create an object of the CalculateArea class. Prompt the user to choose a shape (triangle, rectangle, or circle) and input the required parameters accordingly. Use the appropriate member functions to set the values. Call the area function with the specified shape to calculate and display the area.
13	<p>Program Statement: Addition Class</p> <p>You are tasked with creating a C++ class named Addition that encapsulates the functionality to perform addition with different combinations of integer and floating-point numbers. The class should contain overloaded member functions named add to handle various cases of addition.</p> <ol style="list-style-type: none"> Create a class named Addition with the following public member functions: <ul style="list-style-type: none"> add(int num1, int num2): Takes two integers as arguments and returns the result of their addition. add(int num1, int num2, int num3): Takes three integers as arguments and returns the result of their addition. add(float num1, int num2): Takes a floating-point number and an integer as arguments and returns the result of their addition. add(float num1, float num2): Takes two floating-point numbers as arguments and returns the result of their addition. add(int num1, float num2): Takes an integer and a floating-point number as arguments and returns the result of their addition. In the main function, create an object of the Addition class. Prompt the user to input numbers based on the chosen member function and display the result.
14	<p>Program Statement: Time Addition with Operator Overloading</p> <p>You are required to construct a C++ program that performs the addition of two different timings represented in the form of hours, minutes, and seconds. Implement the program using operator overloading to handle the addition operation for the timings.</p> <ol style="list-style-type: none"> Create a class named Time with the following private member variables:

	<ul style="list-style-type: none"> • hours: Represents the hours component of the timing. • minutes: Represents the minutes component of the timing. • seconds: Represents the seconds component of the timing. <ol style="list-style-type: none"> 2. Implement public member functions: <ul style="list-style-type: none"> • setTime: Takes three integers (hours, minutes, and seconds) as arguments and sets the values. • Overload the + operator to perform the addition of two Time objects. 3. In the main function, create two objects of the Time class. 4. Prompt the user to input the first timing (hours, minutes, and seconds) and set the values using the setTime function. 5. Repeat the process for the second timing. 6. Use the + operator to add the two timings and display the result in the form of hours, minutes, and seconds.
15	<p>Program Statement: Age Calculation with Operator Overloading</p> <p>You are tasked with developing a C++ program that calculates the age of a person in terms of years, months, and days. The program should take the date of birth and current date as input from the user and utilize operator overloading to perform the necessary calculations.</p> <ol style="list-style-type: none"> 1. Create a class named Person with the following private member variables: <ul style="list-style-type: none"> • dob: Represents the date of birth. • currentDate: Represents the current date. 2. Implement public member functions: <ul style="list-style-type: none"> • setDOB: Takes the date of birth as input and sets the value. • setCurrentDate: Takes the current date as input and sets the value. • Overload the - operator to calculate the age in terms of years, months, and days. 3. In the main function, create an object of the Person class. 4. Prompt the user to input the date of birth and set the value using the setDOB function. 5. Repeat the process for the current date. 6. Use the - operator to subtract the date of birth from the current date, resulting in the age in terms of years, months, and days. 7. Display the calculated age.
16	<p>Create two classes named Mammals and MarineAnimals. Create another class named BlueWhale which inherits both the above classes. Now, create a function in each of these classes which prints "I am mammal", "I am a marineanimal" and "I belong to both the categories: Mammals as well as Marine Animals" respectively. Now, create an object for each of the above class and try calling function of Mammals by the object of Mammal function of MarineAnimal by the object of MarineAnimal function of BlueWhale by the object of BlueWhale 4 function of each of its parent by the object of BlueWhale</p>
17	<p>Create the class student having the data members are roll no and name and the member function are get data & put data for displaying the details. Create a class student address which inherit the student class. It contains the data member as address, and member functions are get add and put add for getting the address from user and displayed the address on screen. Create the class studentdob inherit from student address class having data members day, month & year, and member functions are get DoB and put Dob for getting the input and display the dob on the monitor screen. Finally display the complete details of the student on monitor screen.</p>

18	Create the class employee having the data members are emp-id and name and the member function are get data & put data for displaying the details. Create a class emp address which inherit the employee class. It contains the data member as address, and member functions are getadd and putadd for getting the address from user and displayed the address on screen. Create the class empl_dept inherit from employee class having data members department, and member functions are getdept and putdept for getting the input and display the department on the monitor screen. Finally display the details by using the different derived class objects.
19	Create the class employee having the data members are emp-id and name and the member function are getdata & putdata for displaying the details. Create a class emp_address which inherit the employee class. It contains the data member as address, and member functions are getadd and putadd for getting the address from user and displayed the address on screen. Create the class emp_dept inherit from employee class having data members department, and member functions are getdept and putdept for getting the input and display the department on the monitor screen. Create the employee salary class which inherit the emp_address and emp_dept, having the data members gross salary and member functions are getsal and put sal for getting and displaying the salary respectively. Finally display the details by using the object of employee salary.
20	Write a C++ program to dynamically allocate memory for a 2D array. The program should prompt the user to enter the number of rows and columns for the array. It should then dynamically allocate memory for the 2D array using the new operator. Next, ask the user to input integer values into the array. Finally, calculate and display the sum of all the values in the array.
21	Make a class named Fruit with a data member to calculate the number of fruits in a basket. Create two other class named Apples and Mangoes to calculate the number of apples and mangoes in the basket. Print the number of fruits of each type and the total number of fruits in the basket.
22	We want to calculate the total marks of each student of a class in Physics, Chemistry and Mathematics and the average marks of the class. The number of students in the class are entered by the user. Create a class named Marks with data members for roll number, name and marks. Create three other classes inheriting the Marks class, namely Physics, Chemistry and Mathematics, which are used to define marks in individual subject of each student. Roll number of each student will be generated automatically.
23	We want to store the information of different vehicles. Create a class named Vehicle with two data member named mileage and price. Create its two subclasses *Car with data members to store ownership cost, warranty (by years), seating capacity and fuel type (diesel or petrol). *Bike with data members to store the number of cylinders, number of gears, cooling type (air, liquid or oil), wheel type (alloys or spokes) and fuel tank size (in inches). Make another two subclasses Audi and Ford of Car, each having a data member to store the model type. Next, make two subclasses Bajaj and TVS, each having a data member to store the make-type. Now, store and print the information of an Audi and a Ford car (i.e. model type, ownership cost, warranty, seating capacity, fuel type, mileage and price.) Do the same for a Bajaj and a TVS bike.
24	Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two

	other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle". Now, try calling the function by the object of each of these classes.
25	All the banks operating in India are controlled by RBI. RBI has set a well-defined guideline (e.g. minimum interest rate, minimum balance allowed, maximum withdrawal limit etc) which all banks must follow. For example, suppose RBI has set minimum interest rate applicable to a saving bank account to be 4% annually; however, banks are free to use 4% interest rate or to set any rates above it. Write a program to implement bank functionality in the above scenario. Note: Create few classes namely Customer, Account, RBI (Base Class) and few derived classes (SBI, ICICI, PNB etc). Assume and implement required member variables and functions in each class.
26	Write a C++ program to implement the following class hierarchy: Student: id, name Student Exam (derived from Student): Marks of 6 subjects Student Result (derived from Student Exam) : percentage Define appropriate functions to accept and display details. Create 'n' objects of the Student Result class and display the mark list.
27	<p>You have to create 2 classes:</p> <p>Simple Calculator - Takes input of 2 numbers using a utility function and performs +, -, *, / and displays the results using another function.</p> <p>Scientific Calculator - Takes input of 2 numbers using a utility function and performs any four scientific operation of your choice and displays the results using another function.</p> <p>Create another class Hybrid Calculator and inherit it using these 2 classes. Also, answer the questions given below.</p> <p>What type of Inheritance are you using?</p> <p>Which mode of Inheritance are you using?</p> <p>Create an object of Hybrid Calculator and display results of simple and scientific calculator.</p>
28	Imagine you are working on a computer program that needs to find the greatest number in a 3x3 matrix. The matrix is dynamically allocated in memory, and you need to use a pointer to an array to perform the required operation. Your task is to write a C++ program that takes input for the matrix elements from the user, dynamically allocates memory for the matrix, stores the elements in the matrix, and then finds the greatest number within the matrix using the pointer to the array.
29	Imagine you are developing a calculator program in C++ that allows users to perform various mathematical operations. As part of the program, you want to implement a feature that allows users to select the desired operation using function pointers. Your task is to write a C++ program that demonstrates the use of function pointers in a calculator application. The program should provide a menu with different mathematical operations such as addition, subtraction, multiplication, and division. When the user selects an operation, the corresponding function pointer should be used to perform the calculation.
30	Imagine you are working on a text analysis program in C++ that needs to read a file and determine the total number of characters and vowels present in it. The program should be able to handle different text files and provide accurate counts. Your task is to write a C++ program that reads a user-specified file, counts the number of characters (excluding special characters and whitespace), and also counts the number of vowels present in the file. The program should output the total count of characters and vowels to the user.

31	Imagine you are working on a data analysis program in C++ that needs to read a file containing a list of numbers and determine the total count of even and odd numbers in it. The program should be able to handle different files and provide accurate counts. Your task is to write a C++ program that reads a user-specified file, counts the number of even and odd numbers present in it, and outputs the total counts to the user.
32	Write a C++ Program to reverse a given string and find the string is palindrome or not Example: Sample input: w3resource (any string you can consider) Sample output: ecrusor 3w
33	Write a C++ program to change every letter in a given string with the letter following it in the alphabet (i.e a becomes b, p becomes q, z becomes a)
34	Write a C++ to capitalize the first letter of each word in a given string. Words must be separated by only one space.
35	Write a C++ program to count all the vowels in a given string.
36	Write a C++ program to count all the words in a given string.
37	Write a C++ program to insert a dash character (-) between two odd numbers in a given string of numbers.