**Object oriented programming**

**CIA-1 LAB Questions**

**Class: CSBS/II Year**

**Code: CSE 216**

**Date: 23.09.23**

1. a) **Write a program using function to reverse the given element of an array and print it using call by value and reference.**

b) **Write a C++ program that uses preprocessor directives to perform the following tasks: a. Define a macro named PI that represents the value of π (3.14159265359).** a). Define a macro named MAX(x, y) that takes two arguments and returns the maximum of the two. b). Use the #ifdef and #ifndef directives to check if a macro named DEBUG is defined or not. If DEBUG is defined, print "Debug mode is active" to the console. If not, print "Debug mode is inactive." c). Use the #define directive to create a contant integer named NUM\_ELEMENTS with a value of 10.

1. a) **Write a C++ program that uses an inline function to calculate the area of various geometric shapes: rectangles, triangles, and circles**.

Define the following inline functions:

* inline double CalculateRectangleArea(double length, double width) that calculates the area of a rectangle using the formula: area = length \* width.
* inline double CalculateTriangleArea(double base, double height) that calculates the area of a triangle using the formula: area = 0.5 \* base \* height.
* inline double CalculateCircleArea(double radius) that calculates the area of a circle using the formula: area = π \* radius \* radius, where π is a constant value (you may define it as a constant variable or use a preprocessor macro).

In the main() function display a menu to the user with options to calculate the area of a rectangle, triangle, or circle. Based on the user's choice, read the required dimensions (e.g., length, width, base, height, or radius) from the user.Use the appropriate inline function to calculate and display the area of the chosen shape. Implement error handling to ensure that the user enters valid dimensions (e.g., positive numbers). Run the program, test it with different geometric shapes, and verify that the inline functions correctly calculate the areas.

b) **Create a class called POINT with two data members X and Y. include the followingmember function in POINT class (i) READ() member function gets the input for X and Y from the user. (ii) DISPLAY( ) member function is used to print X and Y values. (iii) FIND\_DISTANCE() overloaded member functions to find the distance between**

a. Invoking object and the origin.

b. Invoking object and another POINT values(X-coordinate and Y-coordinate as the parameters).

In main() declare an object for the POINT class and calculate distances for that object.

3. **Designing a program that manages a student's corse enrollment. Each student has a name and a course code associated with them. Implement a C++ class called "Student" that has the following specifications:**

1. The class should have private member variables for the student's name and course code.
2. It should have a parameterized constructor that takes the student's name and course code as arguments and initializes the corresponding member variables.
3. It should have a default constructor that initializes the member variables to empty values.
4. Implement a destructor that displays a message indicating the destruction of a student object.

In your main function, create two Student objects: one using the default constructor and another using the parameterized constructor. Display the details of both students and ensure that the destructor is called for each student object at the end of the program.

Provide the code for the "Student" class with the specified constructor, destructor, and the main function that creates the objects and displays their details.

b) Create a function to calculate the sum of the given series x+x2+x3+x4+. . . + xn , by receiving X and N (5 as default for N) values as arguments. Overloaded this function for X as int,float and N as float type. In main( ) demonstrate this function overloadingwith and without using default argument. (Don’t use pow()).

1. a) **Create a program that simulates a simple banking system. Implement a C++ class called "BankAccount" that represents a bank account. The class should have the following specifications:**
2. Private member variables for the account number, account holder's name, and account balance.
3. A parameterized constructor that takes the account number, account holder's name, and initial account balance as arguments and initializes the corresponding member variables.
4. A default constructor that initializes the member variables to default values.
5. A member function called "deposit" that takes an amount as an argument and adds it to the account balance.
6. A member function called "withdraw" that takes an amount as an argument and subtracts it from the account balance.
7. Ensure that the withdrawal amount does not exceed the account balance.
8. Display an appropriate error message if the withdrawal amount is greater than the account balance.
9. Implement a destructor that displays a message indicating the closure of the bank account.

In your main function, create two BankAccount objects: one using the default constructor and another using the parameterized constructor. Perform deposit and withdrawal operations on both accounts and display the updated account balances after each transaction. Finally, ensure that the destructor is called for each BankAccount object at the end of the program.

Provide the code for the "BankAccount" class with the specified constructor, destructor, member functions, and the main function that creates the objects, performs transactions, and displays the account balances.

b) **Write a C++ program to implement the binary search.**

5. a) **Creating a program that models a library system. Implement a C++ class called "Book" that represents a book in the library. The class should have the following specifications:**

1. Private member variables for the book's title, author, and publication year.
2. A parameterized constructor that takes the book's title, author, and publication year as arguments and initializes the corresponding member variables.
3. A default constructor that initializes the member variables to default values.
4. Implement getter functions for each member variable to retrieve their values.
5. Implement a destructor that displays a message indicating the removal of a book from the library.

In your main function, create two Book objects: one using the default constructor and another using the parameterized constructor. Set different values for the member variables in each object. Display the details of both books by retrieving their information using the getter functions. Finally, ensure that the destructor is called for each Book object at the end of the program.

Provide the code for the "Book" class with the specified constructor, destructor, getter functions, and the main function that creates the objects, retrieves book details, and displays the information.

b) Write a C++ Program to implement sorting.

1. a) Create a class Employee with private member variables, id(int), name(string), salary(float), and department (Example departments: Production, Marketing, Finance, Admin, etc.). Implement public functions to get and display Employee details. In the main function get ‘n’ employee details and display it. Also find thehighest paid employee in Marketing department using a member function.

b) Write a C++ program to create a class called Complex to implement the following functions on Complex type objects. READ/INPUT, ADD, SUBTRACT, MULTIPLY and PRINT with return the resultant object. Write the program with required constructors, member functions with necessary arguments and return types.

7. a) An electricity board charges the following rates to domestic users to discourage large consumption of energy. For the first 100 units Rs 1.50 per unit For the next 200 units Rs 3.00 per unit Beyond 300 units Rs.5.00 per unit All users are charged a minimum of Rs. 100. If the total cost exceeds Rs.250, then an additional surcharge of 15% is added. Write a program to read the name of user and number of units consumed and print out the charges with name.

b) Write C++ program to demonstrate inline function.