AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH (AIUB)
Faculty of Science and Technology (FST)
Department of Computer Science (CS)
Introduction to Programming Final term Lab Assignment

Marks: 30

Part A: Theoretical Analysis

1. What are access specifiers in class? Explain the types with a single code implementation and show/write the differences.
2. Explain Default Constructor, Parameterized Constructor, Destructor with short code implementation. Show the differences between constructor and destructor.
3. What is function overloading? Explain and show a short code implementation.
4. What is inheritance and what are the advantages of using inheritance? Explain single inheritance and show with a short code implementation.
5. What is Encapsulation and Abstraction? Show with a short code implementation.
6. What are the advantages of using a pointer? How can we allocate memory and deallocate memory using pointer? Explain and show short code implementation.

Part B: Code Writing

7. Write a C++ program that will take 9 years as input and store them in a 2D array of size 3x3. Print the most recent year, oldest year, and leap years from the 2D array.

8. Create a structure namely Employee and implement the code using the following information.

Properties of structure **Employee**	Description
EmployeeName	String type
EmployeeID	String type
EmployeeSalary	Float type
JoiningYear	Int type
Void SetEmployeeInfo(name, id, sal, year)	// set the information of the structure

Float SetBonus()	// if the salary of the employee is greater than 25000 and joining year is before 2016, then the employee will get 30% bonus.
	
	// if the salary of the employee is greater than 20000 and joining year is before 2018, then the employee will get 20% bonus
	
	// otherwise the employee will get 5% bonus.

Void DisplayInfo()	//this function will print all the information.

9. A library seat reservation system has a class namely LibraryTokenReservation. Two lists are mentioned below which contain the price details and the class details.

Class Members	Data Type	Access Specifier
FromTime, ToTime	string	private
TokenPrice	float	protected
TokenQuantity	integer	private
SetTokenInfo(to, from)	void	any
Parameterized Constructor to take the quantity		
CalculatePrice()//calculates the total price of tokens	void	any
Bool Membership()//if customer has membership give 5% discount.	boolean	any
Display TokentInfo()//Prints all the information of the ticket	void	any

From	To	TokenPrice
9 AM	1 PM	200 TK
12 PM	3 PM	300 TK
1 PM	5 PM	420 TK
3 PM	7 PM	500 TK

Create object to call the parameterized constructor and access all the methods.

10. Write a C++ program that has two classes one is the base class namely Car and the name of the derived class is TeslaAutopilot. The information about the classes are given below.

Car	TeslaAutopilot
Protected: CarName, CarID, CarColor, Price	Private: CarType // Autonomous or not Private: TaxPercentage

Public:
Car(CarName, CarID, CarColor, Price)
// A parameterize constructor which will assign values to the variables
 	
Void DisplayCarInfo()
//prints the name, id, color and price of the car
	Public:
	TeslaAutopilot(CarName, CarID, CarColor, Price, CarType, Tax) //
	A parameterized constructor which will set the values of the variables
	Void DisplayTeslaInfo()
	//prints the name, id, color, price, car type and tax percentage

	float FinalPrice() // It will deduct the tax from the price of the car and return the final price.

Create objects for both of the classes and show all the functionalities.

Deadline: 24/12/2023, 6:00 PM