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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Electronics and communication Engineering **Duration: 3 hrs.**

Course Code: 23EC5PE1OP / 22EC5PE1OP **Max Marks: 100**

Course: Object Oriented Programming using C++

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Explain the features of Object-Oriented Programming	-	-	**05**

	b)	What is the return value of f(p, p) if the value of p is initialized to 5 before the call?
		int f(int &x, int c) {
		c = c - 1;
		if (c == 0) return 1;
		x = x + 1;
		return f(x, c) * x;
		}
			CO1	*PO1*	**05**

	c)	Write a C++ program to implement a class called Circle that has private member variables for radius. Include member functions to read, display and calculate the circle's area and circumference. Member functions should be defined outside the class. Write main function to create 15 circle objects and calculate area and circumference of those objects.	*CO1*	*PO1*	**10**
		OR			
2	a)	Distinguish between procedural programming and object-oriented programming.	*CO1*	*PO1*	**05**

	b)	Predict the output of the following
		#include<iostream>
		using namespace std;
		int x = 100;
		void fun()
		{
		int x = 2;
		{
		int x = 1;
		cout<<"the value of global X in Function is" << ::x << endl;
		cout<<"the value of local X in Function is" << ::x << endl;
		}
			CO3	*PO2*	**05**

			}
			
			int main()
			{
			int x=50;
			cout<<"Value of x is"<<x<<endl;
			fun();
			cout<<"value of X is"<<::x<<endl;
			return 0;
			}			

		c)	Write a C++ program to implement a class called Date that has private member variables for day, month, and year. Include member functions to set and get these variables, as well as to validate if the date is valid. Member functions should be defined outside the class.	*CO3*	*PO2*	**10**
			UNIT - II			

	3	a)	Explain inline functions. What are the advantages of inline functions?
			void func(){ i1 …… i15}
			int main()
			{
			func();
			}
			func() has 15 instructions. Can func() be considered inline, and abiding the rules of inline, Justify your answer.
				CO1	*PO1*	**05**

		b)	Develop a program to find minimum of private variables of two different classes.	*CO3*	*PO2*	**05**

		c)	class complex
			{
			int r,i;
			….
			}
			int main()
			{
			Complex c1,c2,c3;
			….
			c3.add(c1,c2);
			add(c1,c2,&c3);
			....
			}
			Complete the given code with appropriate functions to read display and two complex objects that supports the function call given in main.
				CO2	*PO2*	**10**

			OR			
	4	a)	Explain dynamic constructors with an example	*CO1*	*PO1*	**05**

		b)	Complete the code by writing function definitions for the function calls in the main function.
			class demo {
			
			Write your code here
			}
			int main()
			{
			demo object;
			object.display();
			object.display("Hello");
			object.display(10);
			object.display(5.5,6.5F);
			}
				CO2	*PO2*	**05**

		c)	You are building a university system to manage student records. The student class should allow the creation of student records in the following ways: 1. A default student record with placeholder information. 2. A student record with both the student's name and age. 3. A student record with only the name (assumes a default age). 4. A new student record created by copying an existing student's information.	*CO3*	*PO3*	**10**
			UNIT - III			
	5	a)	What are the rules for overloading operators? What are the operators that cannot be over loaded?	*CO1*	*PO1*	**05**
		b)	Write a program to input a complex object (made of real and imaginery parts and display the same by overloading << and >> operator.	*CO1*	*PO1*	**08**
		c)	Write a program to overload pre increment and post increment for a class **example** with two member variables.	*CO3*	*PO2*	**07**
			OR			
	6	a)	Write a C++program to create a class called "Building" with attributes for address, number of floors, and total area. Create subclasses "ResidentialBuilding" and "CommercialBuilding" that add specific attributes like number of apartments for residential and office space for commercial buildings. Implement a method to calculate the total rent for each subclass.	*CO3*	*PO2*	**07**
		b)	Design a **Vehicle Management System** using **multilevel inheritance** in C++. • **Base Class**: Create a class named Vehicle that includes common properties of all vehicles such as brand, model, and year.	*CO3*	*PO2*	**08**

			• **Derived Class**: Create a class named Car that inherits from Vehicle and adds attributes specific to cars, such as numberOfDoors and fuelType. • **Sub-derived Class**: Create a class named ElectricCar that inherits from Car and includes properties unique to electric cars, such as batteryCapacity (in kWh) and rangePerCharge (in miles). Implement the following: 1. Constructors for all classes to initialize their attributes. 2. A displayDetails method in each class to output the details of the object, ensuring that it displays all relevant information, including inherited and unique attributes. 3. Demonstrate the functionality by creating an object of the ElectricCar class in the main function and displaying its details.			

	c)	#include <iostream>
		using namespace std;
		class A {
		public:
		void display() {
		cout << "Class A Display" << endl;
		}
		};
		class B : public A {
		public:
		void display() {
		cout << "Class B Display" << endl;
		}
		};
		class C : public A {
		public:
		void display() {
		cout << "Class C Display" << endl;
		}
		};
		1. Predict the output of the above program and explain why.
		2. Explain what happens if D tries to call A::display() using obj.A::display().
		3. Suggest a solution to resolve ambiguity in accessing the A class members through the diamond inheritance structure.
			CO3	*PO2*	**05**

			UNIT - IV			
	7	a)	Write a pure virtual function, output_Virtual () for class A which acts as base class for Common and Separate. Print the different messages in each class. Demonstrate it with a main function.	*CO1*	*PO1*	**05**

		b)	Write a program with a class example that has two member variables to demonstrate pointer to objects.	*CO1*	*PO1*	**05**
		c)	Illustrate with a program pointer of base class to access derived class methods.	*CO1*	*PO1*	**05**
		d)	i)Can we declare a static function as virtual. Justify the answer. ii)Can the member functions in base and derived class have the same name? Illustrate with an example program.	*CO2*	*PO2*	**05**
			OR			
	8	a)	Write a c++ program to read the content of the files.	*CO3*	*PO2*	**08**

		b)	Predict the outputs of the following code
			
			inf.seekg(20 std::ios::cur);
			inf.seekg(-25, std::ios::cur);
			inf.seekg(24, std::ios::beg);
			inf.seekg(26);
			inf.seekg(-28, std::ios::end);
				CO3	*PO2*	**06**

		c)	Explain I/O stream in C++.			**06**
			UNIT - V			
	9	a)	Develop function template for finding minimum of elements contained in an array demonstrate for two different data types.	*CO2*	*PO3*	**10**
		b)	Assume an application that has a class **emp** with id, name and salary as member variable. Write read method that accepts values, throws an exception when salary entered is less than 0.	*CO3*	*PO3*	**10**
			OR			
	10	a)	Develop a class template that demonstrates two generic data types being passed for the class template.	*CO2*	*PO3*	**10**
		b)	List and explain the functions available to read and write to a file.	*CO3*	*PO3*	**10**

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