U.S.N.										

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: MEDICAL ELECTRONICS ENGINEERING **Duration: 3 hrs.**

Course Code: 23MD5PCDSA **Max Marks: 100**

Course: Data Structures and Algorithms

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)	List the characteristics of Object oriented programming.	*CO1*	*PO1*	**05**
	b)	Illustrate with suitable example for Call by value and Call by reference.	*CO1*	*PO1*	**07**
	c)	Use function in C++ program to find the factorial of a number.	*CO1*	*PO1*	**07**
	d)	Which of the following OOP concepts allows a class to inherit properties and methods from another class? A) Encapsulation B) Abstraction C) Inheritance D) Polymorphism	*CO1*	*PO1*	**01**
		OR			
2	a)	Develop a program for a student database with attributes such as name, USN, marks of 3 test and member functions to accept and display the details along with average of 3 test.	*CO1*	*PO1*	**09**
	b)	Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power() that takes a double value for n and an int value for p, and returns the result as a double value. Use a default argument of 2 for p, so that if this argument is omitted, the number n will be squared. Write a main() function that gets values from the user to test this function.	*CO1*	*PO1*	**10**
	c)	Which of the following is a benefit of using encapsulation in Object-Oriented Programming? A) It allows easy access to the internal state of an object. B) It enables hiding the internal state and only providing necessary access. C) It decreases code modularity. D) It allows direct manipulation of class attributes by the user.	*CO1*	*PO1*	**01**

			UNIT - II			
	3	a)	Elucidate characteristics of Constructors and Destructors with suitable example.	*CO2*	*PO2*	**10**
		b)	How to make private member inheritable in C++ programming? Explain with an Example.	*CO2*	*PO2*	**09**
		c)	What is the primary purpose of a constructor in a class? A) To initialize object data members when an object is created B) To destroy an object when it goes out of scope C) To perform operations on data members D) To create an object of a class	*CO2*	*PO2*	**01**
			OR			
	4	a)	Illustrate the working of any two types of Inheritance methods.	*CO2*	*PO2*	**09**
		b)	Create a class called Supermarket and consider the following attributes milk, curd and cheese. If the contents are greater than 2 curd, 3 for milk and 4 for cheese then display appropriate message. Write a separate method to check for each condition.	*CO2*	*PO2*	**10**
		c)	Which of the following types of inheritance allows a class to inherit from more than one base class? A) Single inheritance B) Multilevel inheritance C) Multiple inheritance D) Hierarchical inheritance	*CO2*	*PO2*	**01**
			UNIT - III			
	5	a)	Describe the working of Bubble Sorting. Write a program to demonstrate the bubble sorting technique	*CO3*	*PO3*	**09**
		b)	Develop a program for Quick Sorting and state its advantages.	*CO3*	*PO3*	**10**
		c)	How many passes does Bubble Sort make through the array in the worst case? A) One pass B) Two passes C) n passes D) n-1 passes	*CO3*	*PO3*	**01**
			OR			
	6	a)	Explain the concept of Data Structures and their importance. Discuss the different types of data structures with examples	*CO3*	*PO3*	**06**
		b)	Explain the concept of dynamic memory allocation in C programming. How is dynamic memory allocation used in implementing a linked list	*CO3*	*PO3*	**08**
		c)	Which of the following operators is used to allocate memory dynamically in C++? A) malloc() B) calloc()	*CO3*	*PO3*	**06**

			C) new D) free()			
			UNIT - IV			
	7	a)	Discuss the following Stack functions: a) empty() b) size() c) top() d) push() e) pop()	*CO3*	*PO3*	**09**
		b)	Demonstrate Enqueue and Dequeue concept with relevant diagrams	*CO3*	*PO3*	**10**
		c)	Which of the following operations is used to add an element to a stack? A) Pop B) Push C) Peek D) IsEmpty	*CO3*	*PO3*	**01**
			OR			
	8	a)	Explain the stack data structure and its operations in detail. Illustrate stack operations with an example in C++ programming	*CO3*	*PO3*	**10**
		b)	Explain the queue data structure and its operations in detail. Illustrate queue operations with an example in C++ programming	*CO3*	*PO3*	**09**
		c)	Which operation is used to add an element to the queue? A) Pop B) Insert C) Push D) Enqueue	*CO3*	*PO3*	**01**
			UNIT - V			
	9	a)	Explain the followings i. Big oh notation ii. Big omega notation iii. Average case efficiencies	*CO4*	*PO4*	**09**
		b)	how to apply the general framework for analysis of algorithms to recursive algorithms? Explain.	*CO4*	*PO4*	**10**
		c)	What does Big O Notation represent in terms of algorithm analysis? A) The exact running time of an algorithm B) The worst-case scenario of an algorithm's performance C) The best-case scenario of an algorithm's performance D) The average time complexity of an algorithm	*CO4*	*PO4*	**01**
			OR			
	10	a)	What are the General Plan for Analysing the Time Efficiency of Nonrecursive Algorithms	*CO4*	*PO4*	**10**
		b)	Explain the different types of asymptotic notations used in analyzing algorithms	*CO4*	*PO4*	**09**

		c)	Which of the following asymptotic notations represents the upper bound of an algorithm's time complexity? • a) Omega (Ω) • b) Big-O (O) • c) Theta (Θ) • d) Little-o (o)	*CO4*	*PO4*	**01**

****