

**MASTER OF COMPUTER APPLICATIONS**  
**[2024 ONWARDS]**

**FIRST SEMESTER - ASSIGNMENT TOPICS**

**P24CDMCA1- Mathematical Foundations of Computer Applications**

**Assignment topic 1 (any two from the following)**

1. Define each connective (Negation, Conjunction, Disjunction, Conditional, Biconditional). Create truth tables for each connective to show how the truth values are derived based on different input values.
2. Explain and demonstrate the operations of union, intersection, and difference on the following sets:

$$A = \{1, 2, 3\}$$

$$B = \{2, 3, 4\}$$

3. Define a *group*. List and explain the four main properties of a group.

**Assignment topic 2 (any two from the following)**

1. What is a graph. List out its features. Describe Path, Reachability, Connectedness
2. Explain the matrix representation of graphs.
3. Define the following terms in the context of formal languages:

- \* Alphabet
- \* Word
- \* Language

**P24CDMCA2 - Design and Analysis of Algorithms**

**Assignment topic 1 (any two from the following)**

1. Define and explain *time complexity* and *space complexity* with simple examples. Why are these measures important in analyzing algorithms?
2. Describe the *Substitution Method* for solving recurrence relations.
3. Explain the *Divide and Conquer* approach. Discuss how it is applied in the *Merge Sort* algorithm, with an example.

**Assignment topic 2 (any two from the following)**

1. Describe the *Greedy Approach* and how it is applied in the *Huffman Coding problem*
2. Explain the *Backtracking* method with reference to the *8 Queens Problem*.
3. Describe in detail travelling salesman problem using branch and bound approach

### **P24CDMCA3 - Open Source Programming**

#### **Assignment topic 1 (any two from the following)**

1. Explain the basic principles of *Open Source Software Licensing*. Discuss the main features and differences between the *MIT License* and the *GNU General Public License (GPL)*.
2. Describe basic OOP concepts like classes, objects, and inheritance with simple PHP code examples.
3. Discuss the key differences between open source and proprietary software, particularly in terms of licensing, distribution, and user rights.

#### **Assignment topic 2 (any two from the following)**

1. Describe the process of connecting PHP with a MySQL database and executing SQL queries.
2. Explain the steps for creating and managing a repository on *GitHub*
3. Discuss the advantages of using *MySQL* with *PHP* for server-side web scripting. Provide examples of common *PHP/MySQL* functions

### **P24CDMCAE1 - ELECTIVE – I OOAD and Design Patterns**

#### **Assignment topic 1 (any two from the following)**

1. What is *information hiding*, and why is it important in object-oriented programming? Provide examples to illustrate how information hiding can be implemented in a class.
- 2 Describe the *conceptual model of UML*. What are its main components, and how do they contribute to object-oriented modeling?
3. Explain the process of identifying classes and responsibilities in an object-oriented design.

#### **Assignment topic 2 (any two from the following)**

1. Explain the process of identifying classes and responsibilities in an object-oriented design.
2. Explain the *Observer Pattern* in design patterns. Describe its components and provide an example of where this pattern could be applied in a real-world scenario.
3. Discuss the concept of *multithreading* in programming. Explain thread basics and the importance of thread synchronization.

**P24CDMCABC1 - Programming in C and C++**

**Assignment topic 1 (any two from the following)**

1. Define constants, variables, and keywords in C. Provide examples of each, and explain their roles in a C program.
2. Describe the different types of operators in C. Classify them into categories (e.g., arithmetic, relational, logical, bitwise, etc.) and provide examples of each type of operator in use.
3. What is a function in C? Describe how to create a function with simple output parameters.

**Assignment topic 2 (any two from the following)**

1. Compare and contrast structures and unions in C. Explain when to use each, and provide examples to illustrate their usage in a program.
2. Discuss the evolution of object-oriented programming (OOP) and its main characteristics. How do these characteristics differentiate OOP from functional programming?
3. Explain the concepts of classes and objects in C++. Describe constructors and destructors.

**P24CDMCABC2 - Fundamental of data structures**

**Assignment topic 1 (any two from the following)**

1. Define the List Abstract Data Type (ADT). Explain the differences between array-based implementation and linked list implementation in the context of implementing ADT.
2. Implement a singly linked list in C. Write functions to insert an element at the end of the list.
3. What is a Stack ADT? Describe its main operations (push, pop, and peek).

**Assignment topic 2 (any two from the following)**

1. Explain the divide and conquer methodology in the context of searching algorithms. Compare and contrast linear search and binary search.
2. Define a binary search tree (BST) and explain its properties. Write a C program to implement basic operations on a binary search tree.
3. Describe the different ways to represent a graph (adjacency matrix and adjacency list).