University of Engineering & Management, Kolkata

Course: B.Tech. CSE / CSE (AIML)

Semester: 4th

Paper Name: Advanced Programming Laboratory

Paper Code: PCCCS495

Assignment List

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Assignment No 1

1. Write a Java Program to Print "HELLO JAVA".
2. Write a Java Program to add two numbers by declaring variables value.
3. Write a Java Program to calculate factorial value of a declared variable.
4. Write a Java Program to calculate factorial value of a declared variable by creating separate method for factorial segment.
5. Write a Java Program to calculate factorial value of a declared variable by creating separate class and method for factorial segment.
6. Write a Java Program to calculate factorial value of a variable by taking input from command line.
7. Write a Java Program to display whether a number is odd or even
8. Write a Java program to find maximum of three numbers.
9. Write a Java program to swap two numbers.
10. Write a Java program to check whether a year is leap year or not.
11. Write a Java program for following grading system.

    Note: Percentage>=90% : Grade A

    Percentage>=80% : Grade B

    Percentage>=70% : Grade C

    Percentage>=60% : Grade D

    Percentage>=40% : Grade E

    Percentage<40% : Grade F
12. Write a Java program to check whether a number is divisible by 5 or not.

13. An educational institute plans to develop a Java-based Utility System to assist students in performing basic computational and logical operations required in academic activities. The system should demonstrate the use of input/output operations, arithmetic processing, decision-making constructs, modular programming using methods, object-oriented concepts using classes, and command-line arguments**.** As a Java lab student, you are required to design and implement a Java application that satisfies the following functional requirements:

    - Display an appropriate welcome message at the start of execution.
    - Perform basic arithmetic processing using declared variables.
    - Compute a mathematical result using iterative logic, and demonstrate modularity by implementing the logic using methods and separate classes.
    - Accept user input both through the keyboard and via command-line arguments.
    - Classify numeric input based on given conditions.

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Assignment No 2

1. Write a java program to create a simple array and access array element.
2. Write a java program to create 2D array and access the array element.
3. Write a Java program to find the sum of even numbers in an integer array.
4. Write a Java program to calculate Sum of two 2-dimensional arrays.
5. Write a Java program to find the sum of diagonal elements in a 2D array.
6. Write a Java program to multiply two matrices.
7. Implementation of default, no argument Constructor.
8. Implementation of parameterized constructor.
9. Implementation of returning the value from the caller method.
10. Implementation of call by value and call by reference.
11. A college plans to develop a Java-based Student Marks Analysis System to process and analyze academic data efficiently. The system should store student marks using arrays and perform various analytical and decision-making operations on the stored data. As a Java lab student, you are required to design and implement a Java program that meets the following functional requirements:
    - Store the marks of a given number of students using a one-dimensional array.
    - Accept marks from the user at runtime.
    - Compute and display statistical information such as total and average marks.
    - Identify the highest and lowest marks from the dataset.
    - Classify each student's result based on predefined evaluation criteria.
    - Display all stored marks in an organized format.
    - Ensure proper validation of input values.

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Assignment No 3

1. Write a java program to implement BufferedReader class.
2. Write a java program to take input from keyboard using Scanner class.
3. Write a Java program to reverse a number.
4. Write a Java program to check whether a number is palindrome or not.
5. Write a Java program to check whether a number is prime or not.
6. Write a Java program to convert a Binary Number to Decimal and Decimal to Binary.
7. Write a Java program to check whether a given number is Armstrong Number or not.
8. Write a Java program to calculate the sum of natural numbers up to a certain range
9. Write java codes to implement the followings –

   Basic string handling concepts- Concept of mutable and immutable string, Methods of String class-charAt(), compareTo(), equals(), equalsIgnoreCase(), indexOf(), length() , substring().; toCharArray(), toLowerCase(), toString(), toUpperCase() , trim() , valueOf() methods,
10. Write java codes to implement the followings –

    Methods of Stringbuffer class: append(), capacity(), charAt(), delete(), deleteCharAt().; ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString().
11. A software training institute is developing a Java-based Dynamic Text Editor to demonstrate how mutable strings can be efficiently handled in Java. The editor should allow users to build, modify, analyze, and manage textual content dynamically during program execution. As a Java lab student, you are required to design and implement a Java program that performs the following operations as part of the text editor system:
    - Create a dynamic text object and initialize it with user-defined content.
    - Display the current text along with its length and memory capacity.

- Add additional text to the existing content dynamically.
- Access and display a specific character from the text based on user input.
- Insert new text at a specified position within the existing content.
- Search for a given word or character sequence and display its position.

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Assignment No 4

1. Implementation of method overloading with respect to parameter number, parameter data type.
2. Write a java program to implement of constructor overloading.
3. Implementation of this keyword to invoke current class method.
4. Implementation of this keyword to invoke current class constructor.
5. Implementation of this keyword to pass as an argument in the method.
6. Implementation of this keyword to pass as argument in the constructor call.
7. Implement - this keyword can be used to return current class instance.
8. Prove that this keyword refers to the current class instance variable.
9. Implementation of this keyword as local variable suppressor.
10. Create a general class ThreeDObject and derive the classes Box, Cube, Cylinder and Cone from it. The class ThreeDObject has methods wholeSurfaceArea () and volume (). Override these two methods in each of the derived classes to calculate the volume and whole surface area of each type of three-dimensional objects. The dimensions of the objects are to be taken from the users and passed through the respective constructors of each derived class. Write a main method to test these classes.
11. An online learning platform is developing a Document Processing System to allow users to create and modify textual content efficiently. The system should support dynamic text creation, editing, searching, and memory management. Design and implement a Java program that allows the user to create a document, add and modify content dynamically, search for specific text, extract required portions, manage memory allocation for text storage, and finally generate the processed document as a standard string.

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Assignment No 5

1. Write a java program to implement the static keyword in java.
2. Write a java program to implement the static method in java.
3. Write a java program to implement the single inheritance in java.
4. Write a java program to implement the hierarchical inheritance in java.
5. Write a java program to implement the multilevel inheritance in java.
6. Multiple inheritance does not support in java – justify.
7. Implementation of method overriding in java.
8. Implementation of dynamic method dispatch in java.
9. Write a java program to stop method overriding.
10. Create a "circle" class & a "point" class. The coordinates of the circle are given and used within the "circle" class as object of the "point" class. Display the area of circle.
11. Write a program to define a class Employee to accept emp_id, emp _name, basic_salary from the user and display the gross_salary.
12. Write a program to define a class Fraction having data members numerator and denominator. Initialize three objects using different constructors and display its fractional value.
13. Write a program to define a class Item containing code and price. Accept this data for five objects using array of objects. Display code, price in tabular form and also, display total price of all items.

14. An organization plans to develop a Payroll Management System to handle salary calculations for different types of employees. All employees share common attributes such as employee ID, name, and basic salary, while different employee categories have their own additional allowances and deductions. Design and implement a Java program using inheritance where a base class represents a general employee and derived classes represent different employee types. The program should calculate and display the salary details for each employee category.

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Assignment No 6

1. Write a java program to implement the abstraction property.
2. Write a java program to implement interface.
3. Write a java program to implement multilevel inheritance with the help of interface.
4. Write a java program to implement the inheritance in interface.
5. Write a java program to implement multiple inheritance using interface.
6. Write a java program to implement super keyword in java.
7. Write a java program to implement super() method without parameter.
8. Write a java program to implement super() method with parameter.
9. Create an interface called Player. The interface has an abstract method called play() that displays a message describing the meaning of "play" to the class. Create classes called Child, Musician, and Actor that all implement Player. Create an application that demonstrates the use of the classes
10. Create an abstract class Accounts with the following details:
    Data Members: Balance (b) accountNumber (c) accountHoldersName (d) address
    Methods: withdrawl()- abstract, (b) deposit()- abstract, (c) display() to show the balance of the account number
    Create a subclass of this class SavingsAccount and add the following details:
    Data Members: (a) rateOfInterest
    Methods: (a) calculateAount()

11. A company wants to manage employee information. Every employee has a unique ID and name. Each employee is assigned to a department with a department name and code. The company also wants to calculate the total salary by considering basic salary and allowances. Design a Java program using multilevel inheritance where:

    - Base class stores employee details.
    - Intermediate class stores department details.
    - Final class calculates total salary and displays full employee information.

12. A transport company needs to maintain information about its vehicles. Each vehicle has a registration number and brand. Vehicles have engine details like type and capacity. For certain vehicles like cars and trucks, the company wants to calculate fuel efficiency and display complete vehicle information.
    Implement a Java program using multilevel inheritance:
    - Base class stores vehicle information.
    - Intermediate class stores engine details.
    - Final class calculates efficiency and displays full details.

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Assignment No 7

1. Implementation of final keyword before a variable.
2. Implementation of final keyword before a method.
3. Implementation of final keyword before a class.
4. Write a java program to create package.
5. Write a java program to create a subpackage.
6. Write a java program to access the methods from package.
7. Write a java program to access the methods from package & subpackage both.
8. Write a java program to observe the utility of public access specifier.
9. A coaching center needs a simple Java application to store student details and calculate their grades. The admin should be able to add students and view their results.

   Requirements

   - Store student ID, name, and marks
   - Calculate grade
   - Display student details
   - Use OOP and collections

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Assignment No 8

1. Exception CASE-1: Problem without exception handling
2. Exception CASE-2: Exception creates but properly handled
3. Exception CASE-3: Exception creates but not handled
4. Write a java program to implement Java Multi catch block
5. Write a java program to implement Java Nested try statement
6. Write a java program to implement the throw keyword.
7. Write a java program to implement the throws keyword.
8. Finally CASE – 1 : Case 1: finally example where exception doesn't occur.
   Case 2: finally example where exception occurs and not handled.
   Case 3: finally example where exception occurs and handled.
9. Create a user-defined exception named CheckArgument to check the number of arguments passed through the command line. If the number of argument is less than 5, throw the CheckArgumentexception,else print the addition of all the five numbers.
10. Consider a Student examination database system that prints the mark sheet of students. Input the following from the command line.
    (a) Student's Name
    (b) Marks in six subjects

    These marks should be between 0 to 50. If the marks are not in the specified range, raise a RangeException, else find the total marks and prints the percentage of the students.
11. Find the Longest Substring Without Repeating Characters
    Write a program to find the length of the longest substring without repeating characters.
12. Longest Palindromic Substring
    Find the longest palindromic substring in a given string.

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Assignment No 9

1. Write a java program to create Thread by extending the Thread class.
2. Write a java program to create Thread by implementing the Runnable interface.
3. Write a java program to implement the yield( ) method in thread programming.
4. Write a java program to implement the sleep(n) method in thread programming.
5. Write a java program to implement the suspend( ) & resume( ) method in thread programming.
6. Write a java program to implement the sleep(n) method in thread programming.
7. Create 4 threads with priority 1,3,5,7 respectively. Update a counter in each of the threads for 10 ms. Print the final value of count for each thread.
8. Write a Java Program to Synchronize the Threads Acting on the Same Object. The Synchronized Block in the Program can be Executed by Only One Thread at a Time.
9. Write a Java Program to Check a Thread is Alive or Not.
10. Write a Java Program to Get the Name of a Running Thread.
11. Design a Library Management System
    Use classes, inheritance, and polymorphism. Include Books, Members, Borrow/Return functionality.
12. Implement a Simple ATM System
    Include account management, balance check, deposit, withdrawal, and PIN verification.

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Assignment No 10

1. Write a java program to implement the concept of Applet.
2. Write a java program to implement the parameter passing applet.
3. Write a java program to implement JButton Class.
4. Write a java program to implement JTextField Class.
5. Write a java program to implement JPanel Class.
6. Write a java program to implement JMenu Class.
7. Write a java program to implement Chat Frame comprising JFrame, JMenuBar, JMenu, JMenuItem, JPanel, JLabel, JTextField, JButton etc.
8. Shape Hierarchy Using Inheritance
   Implement a base class `Shape` and derived classes `Circle`, `Rectangle`, and `Triangle` to calculate area and perimeter.
9. Polymorphic Calculator
   Implement a calculator using method overloading and overriding to handle different operations (add, subtract, multiply, divide) for int and double.