Object Oriented Programming using Java
LAB PLANNING[MCA-1 BATCH 2025]

Lab	Category	No.	Programs	Hrs.
Practical -1: C Programs				
1	A	1	WAP to find a Factor of a given number.[A]	2
	A	2	WAP to find a sum of numbers entered by user. (E.g: 582=5+8+2=15) [A]	
	A	3	WAP to find a sum of even number 1D array. [A]	

	A	4	Print the following Patterns: [A]
			`*  *  *  *****  *`
			`**  **  **  ****  **`
			`***  ***  ***  ***  ***`
			`****  ****  ****  **  ****`
			`*****  *****  *****  *  ***`
			`**`
			`*`	

	B	5	Print the following Patterns: [B]
			`1  1  d  *****`
			`12  22  da  ####`
			`123  333  dar  ***`
			`1234  4444  dars  ##`
			`12345  55555  darsh  *`
			`darsha`
			`darshan`	

Practical -2: Basic Java Programs				
2	A	1	JDK installation and configuration.[A]	2
	A	2	Write a java program to print Hello World.[A]	
	A	3	Write a java program to take user input [A] i. Through Command Line Argument. ii. Through Scanner class.	
	A	4	Write a program to get 2 numbers from the user and print the sum of two numbers using command line and Scanner class.[A]	
	B	5	Write a program that reads a number in meters, converts it to feet, and displays the result.[B]	
	C	6	Write a program that prompts the user to enter a letter and check whether a letter is a vowel or a constant.[C]	
Practical -3: Programs using operators and data types				
3	A	1	Illustrate the Operator precedence.[A] a. 10 + 20 * 30 b. 100 / 10 * 100 c. 5 * 4 / 4 % 3 d. 100 + 200 / 10 – 3 * 10	2
	A	2	Write a program to create basic calculator by getting 2 numbers and an operation(+,-,/,*,%) from the user and apply the operation given in a string on the given numbers.[A]	
	A	3	Write a program to calculate the area of Rectangle.[A]	
	B	4	Write a program to convert temperature from Fahrenheit to Celsius. (Formula : c = f-32*5/9) [B]	
	C	5	Write a program that prompts the user to enter three numbers. Find the largest number.[C]	

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Practical -4: Programs using if-else ladders, conditional and branching statement				
4	A	1	The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a division as per the following rules: I. Percentage above or equals to 60-first division II. Percentage between 50 to 59-second division III. Percentage between 40 and 49-Third division IV. Percentage less than 40-fail Write a program to calculate the division obtained by the student.[A]	2
	A	2	Write a program to check whether a number is even or odd.[A]	
	A	3	Write a program to find maximum no from given 3 no.(without if-else).[A]	
	A	4	Write a program to check that the given number is prime or not.[A]	
	B	5	Write a program to check whether a year is leap year or not.[B]	
	B	6	Write a program to find that given Number is palindrome or not. [B]	
	C	7	Write a program to print prime numbers between given range. [C]	
Practical -5: Programs using Array and String				
5	A	1	Write a Java program to sum values of an array.[A]	2
	A	2	Write a program that creates and initializes a four integer element array. Calculate and display the average of its values.[A]	
	A	3	Write a program to print given array in reverse order.[A]	
	B	4	Write a Java program to copy all the elements of an array to another array and print both the array elements. [B]	
	B	5	Write an interactive program to print a string entered in a pyramid form. For instance, the string "stream" has to be displayed as follows:[B] s st str stre strea stream	2
	C	6	Write an interactive program to print a diamond shape. For example, if user enters the number 3, the diamond will be as follows:[C] * * * * * * * * *	

Lab	Category	No.	Programs	Hrs.
	C	7	There is an integer array nums sorted in ascending order (with distinct values). Prior to being passed to your function, nums is possibly rotated at an unknown pivot index k (1 <= k < nums.length) such that the resulting array is [nums[k], nums[k+1], ..., nums[n-1], nums[0], nums[1], ..., nums[k-1]] (0-indexed). For example, [0,1,2,4,5,6,7] might be rotated at pivot index 3 and become [4,5,6,7,0,1,2]. Given the array nums after the possible rotation and an integer target, return the index of target if it is in nums, or -1 if it is not in nums.[C] Example 1: Input: nums = [4,5,6,7,0,1,2], target = 0 Output: 4 Example 2: Input: nums = [4,5,6,7,0,1,2], target = 3 Output: -1	
Practical -6: Programs using Class and Object				
6	A	1	Create class Student with attributes (name: String, roll_no:int, SPI:double, course: String). Implement getter() and setter() method to assign data for 3 students and display it.[A]	2
	A	2	Create class Cube with attributes (height, width and depth with double datatype). Implement getter() and setter() method to assign data for 2 cubes. Create method volume() to calculate volume for 2 cubes. [A]	
	A	3	Create class BankDemo and Account(accNum:int, accType:String, balance: double). Implement getter() and setter() method to assign and display data for 3 students.[A]	
	B	4	Implement an array with 5 elements in class A. Create four methods for array operation(sortArray(), searchArray(), SumArray(), and avgArray()) and call all the four methods using object.[B]	
	B	5	Write a Java program to create a class called Employee with a name, job title, and salary attributes, and methods to calculate and update salary.	
	C	6	Write a program to find length of string and print second half of the string.[C]	
Practical -7: Programs using Object Oriented Concepts				
7	A	1	Write a program to create circle class with area function to find area of circle. [A]	2
	A	2	Write a Java program to find the angle between the hour and minute hands.[A]	
	B	3	Create a class which ask the user to enter a sentence, and it should display count of each vowel type in the sentence. The program should continue till user enters a word “quit”. Display the total count of each vowel for all sentences. [B]	
	C	4	Define class for Complex number with real and imaginary as data members. Create its constructor, overload the constructors. Also define addition method to add two complex objects. [C]	
Practical -8:Static & Array of Objects				
8	A	1	Define Time class with constructor to initialize hour and minute. Also define addition method to add two time objects. [A]	
	A	2	WAP that counts the number of objects created using static. [A]	
	A	3	Write a Java program to create a class called BankAccount with instance variables 'accountNo' and balance, and static variables bankName and interestRate. Implement static methods to get and set the static variables. Create three BankAccount objects and print their details along with the static variables. [A]	
	B	4	Write a Java program to create a class called Area with a static final variable PI=3.14159. Implement a method to calculate the area of a circle given its radius.[B]	

Lab	Category	No.	Programs	Hrs.
	C	5	Write a Java program to create a class called House with private instance variables address, numberOfRooms, and area. Provide public getter and setter methods to access and modify these variables. Add a method called calculatePrice() that returns the price of the house based on its area and a price per square meter.[C]	
Practical -9: Programs using inheritance				
9	A	1	Declare a class called Student having following data members:id_no, no_of_subjects_registered, subject_code, subject_credits, grade_obtained and spi. Define constructor and calculate_spi methods. Define main to instantiate an array for objects of class student to process data of n students [A]	2
	A	2	Write a Java program to create a class called Employee with methods called work() and getSalary(). Create a subclass called HRManager that overrides the work() method and adds a new method called addEmployee().[A]	
	A	3	Demonstrate the use of Super Keyword. [A]	
	B	4	Declare a class called book having author_name as private data member. Extend book class to have two sub classes called book_publication & paper_publication. Each of these classes have private member called title. Write a complete program to show usage of dynamic method dispatch (dynamic polymorphism) to display book or paper publications of given author. [B]	
	C	5	4. Design a class named MyPoint to represent a point with x- and y-coordinates. The class contains: The data fields x and y that represent the coordinates with getter methods. 1. a no-arg constructor that creates a point (0, 0). 2. a constructor that constructs a point with specified coordinates. 3. a method named distance that returns the distance from this point to a specified point of the MyPoint type. 4. a method named distance that returns the distance from this point to another point with specified x- and y-coordinates.Create a class named ThreeDPoint to model a point in a three-dimensional space. Let ThreeDPoint be derived from MyPoint with following additional features: 1. A data fields named z that represents the z-coordinate. 2. A no-arg constructor that creates a point (0, 0, 0). 3. A constructor that constructs a point with three specified coordinates. 4. A get method that returns the z value. 5. Override the distance method to return the distance between two points in the three-dimensional space. Write a program that creates two points (0, 0, 0) and (10, 30, 25.5) and display the distance between the two points. [C]	
Practical -10: Programs using abstract class and interface				
10	A	1	The abstract vegetable class has three subclasses named Potato, Brinjal and Tomato. Write a java program that demonstrates how to establish this class hierarchy. Declare one instance variable of type String that indicates the color of a vegetable. Create and display instances of these objects. Override the toString() method of object to return a string with the name of vegetable and its color. [A]	2
	A	2	Write a Java program to create an abstract class BankAccount with abstract methods deposit() and withdraw(). Create subclasses: SavingsAccount and CurrentAccount that extend the BankAccount class and implement the respective methods to handle deposits and withdrawals for each account type.[A]	

Lab	Category	No.	Programs	Hrs.
	B	3	Write a Java program to create an abstract class Vehicle with abstract methods startEngine() and stopEngine(). Create subclasses Car and Motorcycle that extend the Vehicle class and implement the respective methods to start and stop the engines for each vehicle type.[B]	
Practical -11:Programs using abstract class and interface				
11	A	1	Write a program that illustrates interface inheritance. Interface A is extended by A1 and A2. Interface A12 inherits from both A1 and A2.Each interface declares one constant and one method. Class B implements A12.Instantiate B and invoke each of its methods. Each method displays one of the constants. [A]	
	A	2	Create interface EventListener with performEvent() method. Create MouseListener interface which inherits EventListener along with mouseClicked(), mousePressed(), mouseReleased(), mouseMoved(), mouseDragged() methods. Also create KeyListener interface which inherits EventListener along with keyPressed(), keyReleased() methods. WAP to create EventDemo class which implements MouseListener and KeyListener and demonstrate all the methods of the interfaces. [A]	
	B	3	The Transport interface declares a deliver () method. The abstract class Animal is the super class of the Tiger, Camel, Deer and Donkey classes. The Transport interface is implemented by the Camel and Donkey classes. Write a test program that initialize an array of four Animal objects. If the object implements the Transport interface, the deliver () method is invoked. [B]	
	B	4	Write a Java program to create an interface Shape with the getArea() method. Create three classes Rectangle, Circle, and Triangle that implement the Shape interface. Implement the getArea() method for each of the three classes. [B]	
	C	5	Write a Java program to create an interface Playable with a method play() that takes no arguments and returns void. Create three classes Football, Volleyball, and Basketball that implement the Playable interface and override the play() method to play the respective sports. [C]	
Practical -12: Programs using Exception handling				
12	A	1	Write a program to demonstrate Arithmetic Exception and ArrayIndexOutOfBounds Exception using try-catch block. [A]	2
	A	2	Write a program to create Account class, which is representing a bank account where we can deposit and withdraw money. If user need to withdraw money which exceed our minimum bank balance then it will not be allowed, and will throw InSufficientFundException(Custom Exception). Handle above exception and display proper error message. [A]	
	A	3	Write a java program to create Custom Exception (DarshanUniException). Catch this exception using throw clause and print appropriate message. [A]	
	B	4	Write a Java program that divides two numbers. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display appropriate message for each exception. [B]	
	C	5	Write a program in java if number is less than 10 and greater than 50, it generate the exception out of range. Else it displays the square of number. [C]	

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Practical -13: Programs using Multithreading				
13	A	1	Write a java Multithread program [A] i. Using Thread class. ii. Using Runnable Interface.	2
	A	2	Write an application that executes two threads. One thread displays "Good Morning" every 1000 milliseconds & another thread displays "Good Afternoon" every 3000 milliseconds. Create the threads by implementing the Runnable interface. [A]	
	A	3	Write a program to create two threads, one thread will print odd numbers and second thread will print even numbers between 1 to 20 numbers. [A]	
	B	4	WAP to implement the solution to producer consumer problem in Java. [B]	2
	B	5	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number. [B]	
	C	6	Write a complete multi-threaded program to meet following requirements: a. Read matrix [A] m x n b. Create m number of threads c. Each thread computes summation of elements of one row, i.e. ith row of the matrix is processed by i^{th} thread. Where 0 <= i< m. d. Print the results. [C]	
Practical -14: Basic programs using IO programming				
14	A	1	Write a program that counts number of characters, words, and lines in a file. Use exceptions to check whether the file that is read exists or not. [A]	2
	A	2	Write a program to replace all “word1” by “word2” from a file1, and output is written to file2 file and display the no. of replacement. [A]	
	B	3	Write an application that reads a file and counts the number of occurrences of digit 5. Supply the file name as a command-line argument. [B]	
	C	4	Create a class called Student. Write a student manager program to manipulate the student information from files by using FileInputStream and FileOutputStream. [C]	
Practical -15: programs using Advanced IO programming and Collection Framework				
15	A	1	Refine the student manager program to manipulate the student information from files by using the BufferedReader and BufferedWriter. [A]	2
	B	2	Write a program to check that whether the name given from command line is file or not? If it is a file then print the size of file and if it is directory then it should display the name of all files in it. [B]	
	C	3	Write a program to demonstrate the use of ArrayList to store and display List of Student class with StudentID, StudentName, StudentRollNo and StudentSPI. [C]	
	C	4	Write a program to sort as per SPI from the List of students stored as ArrayList in previous program. [C]	