# OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

**COURSE CODE: 20CA3112** **L T P C**

**0 0 3 1.5**

**COURSE OUTCOMES:**

At the end of the course, student will be able to

**CO1:** Identify primitive data types by use of command line arguments and Arrays
**CO2:** Differentiate classes, object and Inheritance
**CO3:** Create Packages and Build applications with Exceptions and Threads
**CO4:** Design GUI with Swing components and Apply event handling on it
**CO5:** Solving problems by making use of classes available in lang, util, i/o and net packages

**List of Programs:**

1) A) Implement the following programs using command line arguments
   i) Accept two strings from the user and print it on console with concatenation of "and" in middle of the strings
   ii) Accept 12-hour time zone and convert into it's corresponding 24-hour time zone.

   Note: Accept hours, minutes and seconds separately from the user (e.g. 07 05 45 PM should be displayed as 19:05:45)
   iii) Accept three subject marks of a student and calculate the percentage and determine the division of the student. (e.g. >=70 distinction, >60 and <70 first class…so on). Print percentage in both float and double formats.
   iv) Accept a number 'n' and print the list of 'n' Fibonacci terms recursively

   B) Perform the above programs using Scanner class.

2) A) Write a program that accepts set of inputs from the user of various integer data types and determines the primitive data type that is capable of properly storing that input.

   B) Write a program that accepts an array of integers and print those which are both odd and prime. If no such element in that array print "Not Found".

   C) There are two players 'A' and 'B' plays a game 'n' times. The points gained by each player are tabulated in two different arrays. Find the number of times each won the game.

   D) Write a program to accept contents into an Integer Array and print the frequency of each number in the order of their number of occurrences.

3) A) Write a program that accepts an 'n' ordered square matrix elements into a single dimension array and print the elements of leading diagonal (top left to bottom right)

   B) Write a program that accepts an 'm x n' double dimension array, where 'm' represents financial years and 'n' represents Ids of the items sold. Each element in the array represents

number of items sold in a particular year. Identify the year and id of the item which has more demand

C) Write a program that accepts an 'n' ordered square matrix and calculate absolute difference between the sum of elements in their diagonals

4) A) Create a class Box that uses a parameterized constructor to initialize the dimensions of a box. The dimensions of the Box are width, height, depth. The class should have a method that can return the volume of the box. Create an object of the Box class and test the functionalities.

B) Create a new class called Calculator with the following methods:

- A static method called powering (int num1,int num2)
- This method should return num1 to the power num2.
- A static method called powerDouble(double num1,double num2).
- This method should return num1 to the power num2.
- Invoke both the methods and test the functionalities. Also count number of objects created.

5) A) Accept a String and a number 'n' from user. Divide the given string into substrings each of size 'n' and sort them lexicographically.

B) Accept Array of strings and display the number of ovals and consonants occurred in each string.

C) Accept 'n' number of strings and reverse the strings in alternate position and display as single string in the order of the input acceptance.

D) Accept two strings from the user and determine if the strings are anagrams or not.

6) A) Create a multilevel inheritance for classes vehicle, brand and cost. The vehicle class determines the type of vehicle which is inherited by the class brand which determines the brand of the vehicle. Brand class is inherited by cost class, which tells about the cost of the vehicle. Create another class which calls the constructor of cost class and method that displays the total vehicle information from the attributes available in the super classes.

B) Create an inheritance hierarchy of Figure_3D, Cylinder, Cone, Sphere etc. In the base class provide methods that are common to all Figure_3Ds and override these in the derived classes to perform different behaviors, depending on the specific type of Figure_3D. Create an array of Figure_3D, fill it with different specific types of Figure_3Ds and call your base class methods.

7) A) Design a package to contain the class Student that contains data members such as name, roll number and another package contains the interface Sports which contains some sports information. Import these two packages in a package called Report which process both Student and Sport and give the report.

8) A) Write a program that reads two numbers from the user to perform integer division into Num1 and Num2 variables. The division of Num1 and Num2 is displayed if they are integers. 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.

   B) Create a user defined exception.

9) A) Write a program that creates 3 threads by extending Thread class. First thread displays "Good Morning" every 1 sec, the second thread displays "Hello" every 2 seconds and the third displays Welcome" every 3 seconds. (Repeat the same by implementing Runnable).

   B) Write a program to perform Thread synchronization.

10) A) Write a program that displays a sample registration page using Swing controls use appropriate layout managers.

   B) Write a program for handling mouse events with adapter classes.

11) A) Write a program to create 3 radio buttons named line, rectangle and oval. Based on the radio button selected, allows user to draw lines, rectangles or ovals as per the locations selected by the user on the applet with mouse.

   B) Write a program to create a Table inside a JFrame.

12) A) For program 10) A) check all the fields filled or not, display success dialogue if all fields are filled with the help of Action Listener. Display error dialogue if at least one field is empty.

   B) Write a program to create three JSliders where each represents colors RED, GREEN and BLUE. Each slider has a value from 0 to 255. The background color of the applet is set based on the values retrieved from each slider to form a color using the color class constructor. On sliding any slider, the background color of applet changes.

13) A) Write a program to implement a new ArrayList class. It should contain add(), get(), remove(), size() methods. Use dynamic array logic.

   B) Create an employee class containing at least 3 details along with Id, setters and getters. Insert the employee objects dynamically key as employee id and value as it's corresponding object into a HashMap. Perform Id based search operation on the HashMap.

14) A) Write a program that reads on file name from the user then displays information about whether the file exists, whether the file is readable/writable, the type of file and the length of the file in bytes and display the content of the using File Input Stream class.

B) Write a program that copies contents from one file to another file.(Using character streams).

C) Write a program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use StringTokenizer class of java.util)

15) A) Write a program that illustrates Vector class and wrapper classes

B) Write a program to generate a set of random numbers between two numbers x1 and x2, and x1>0.

C) Write a program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle.

**Case Studies:**

- Grading a Multiple-choice Test for students
- Create a Person class containing basic details like Name, Gender, Mobile and based on that create and manage the objects that are related to student and employee Classes.
- Create a package called Banking containing classes and interfaces related to various banking operations such as withdrawal, deposits, loans and insurance etc. Create two classes related to any two specific banks that uses this package.
- Write a program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the+, - ,*, % operations. Add a text field to display the result.
- Write a program that implements simple chat application using GUI

**TEXT BOOKS:**

1. Herbert Schildt, "*Java The complete reference"*, 11th Edition, McGrawHill, 2019
2. Timothy Budd, "*An introduction to object-oriented programming"*, 3rd Edition, Pearson Education, 2009.

**REFERENCE BOOK:**

1. Y. Daniel Liang, "*Introduction to Java Programming Comprehensive Version"*, 10th Edition, Pearson, 2015