

**LAB. ASSIGNMENTS (Java)**

Name of the Student:

Student ID:

Course: CBCS/MCA (3rd Sem), 2017

S.No.	Lab. Questions	Deadline	Signature of the teacher
1.	Write a menu driven program to create two $m \times n$ matrix, populate it with random integers and display their sum and product. Also display the time taken by the computer for the product operation. Make use of classes, constructors and necessary methods. Test your program for 500x500 matrix and display the computational time for the product operation.	2 <sup>nd</sup> Week of Aug	
2.	Create a Person class with the following instance variables: number of eyes, number of noses, and number of brains. Create a default constructor that will assign 1 to each of the instance variables. Create a parameterized constructor that will accept user input to assign values. Create a Driver class that creates 10 objects of the person class, each with different parameters, using the parameterize constructor. Create single dimensional array and stores the above 10 objects in it. Print the contents of the array.	2 <sup>nd</sup> Week of Aug	
3.	Create a Rectangle class which stores only the Cartesian coordinates of the four corners of the rectangle. The constructor calls a set function that accepts four sets of coordinates and verified each of these is in the first quadrant with no single x or y coordinate larger than 20.0. The set function also verified that the supplied coordinate do, in fact, specify a rectangle. Provide member functions that calculate the length, width, perimeters and area. The length is the larger of the two dimensions. Include a predicate function isSquare() that determines whether the rectangle is a square.	3 <sup>rd</sup> Week of Aug	
4.	Consider an example of declaring the examination result. Design three classes: Student, Exam and Result. The Student class has data members such as those representing roll number, name, semester, session, etc. Create the class Exam by inheriting the Student class. The Exam class adds data members representing the marks scored in six subjects and credit of each subjects. Derive the Result from the Exam class and it has its own data members such as total_marks and sgpa. Write an interactive program to model this relationship. The program should demonstrate its working on the data of at least 5 students by displaying their results in tabular format. What type of inheritance this model belongs to?	3 <sup>rd</sup> Week of Aug	
5.	A HighSchool application has two classes: the Person superclass and the Student subclass. Using inheritance, in this lab you will create two new classes, Teacher and CollegeStudent. A Teacher will be like Person but will have additional properties such as salary (the amount the teacher earns) and subject (e.g. "Computer Science", "Chemistry", "English", "Other"). The CollegeStudent class will extend the Student class by adding a year (current level in college) and major (e.g. "Electrical Engineering", "Communications", "Undeclared"). Model the above problem and demonstrate its working.	4 <sup>th</sup> Week of Aug	
6.	Define a class Graph that should model a Graph data structure and store its adjacency matrix, and have default (adjacency matrix should be a null matrix) as well as parameterized constructors. Graph class also has two method display() that displays the adjacency matrix, and isConnected() as predicate method that checks whether given graph is connected or not. Create two another classes namely DirectedGraph and WeightedGraph, both inherits Graph. DirectedGraph has two methods indegree() and outdegree() that calculates and indegree and outdegree of each node in the DirectedGraph. Similarly, WeightedGraph has a method shortestPath() that finds the shortest path between two given nodes using any of the algorithm known to you. Write a Test program to demonstrate the working of all the three classes.	4 <sup>th</sup> Week of Aug	