COURSE CONTENT

DESIGN AND ANALYSIS OF ALGORITHMS THROUGH JAVA LABORATORY								
IV SEMESTER : CSE / CSM								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
2440576	**Foundation**	0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 30**				**Total Classes: 30**		
Prerequisites: **Problem Solving Using C and C++ Lab**								

Course Overview:

This course focuses on problem solving using Object oriented concepts by using JAVA programming. It also gives insight implementation of algorithms using JAVA.

Course Objectives:

1. Installing and using of any IDE
2. Java Standard API library such as util, io, applets, GUI based controls.
3. Exception handling mechanism, multithreading, packages and interfaces.
4. How to use Collection framework
5. How to implement different algorithm models using java.

Course Outcomes: After Completion of the Course, Students should be able to

- Develop Java programs using IDE features including debugging, code formatting, refactoring, and implementation of basic control structures and mathematical computations.
- Implement string manipulation and object-oriented programming concepts including overloading, overriding, abstraction, inheritance, and polymorphism.
- Construct multithreaded applications and synchronization mechanisms including producer–consumer problem and inter-thread communication.
- Apply Collection Framework classes including ArrayList, LinkedList, HashSet, Hashtable, and TreeMap for data processing and sorting operations.
- Design algorithmic solutions using greedy, dynamic programming, backtracking, and branch and bound techniques for classical optimization problems.

List of Programs:

1.

a. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

b. Write a java program that prints all real solutions to the quadratic equation ax2 +bx+c=0. Read in a, b, c and use the quadratic formula.

c. Write a java program to implement Fibonacci series.

2. Write Java Programs to perform following:
   a. To count occurrence of each character in a string.
   b. To remove duplicate words from a string.
   c. To print all permutations of a string.

3.
   a. Write a java program to implement method overloading and constructors overloading.
   b. Write a java program to implement method overriding.
   c. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle,Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

4.
   a. Write a java program to check whether a given string is palindrome.
   b. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

5.
   a. 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. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

6. Write programs to implement following using Collection Framework:
   a. to add, retrieve & remove element from ArrayList
   b. to Sort & reverse the LinkedList elements
   c. to sort ArrayList using Comparable and Comparator

7. Write programs to implement following using Collection Framework:
   a. to copy elements from HashSet to Array
   b. to remove duplicate key from hashtable
   c. to iterate TreeMap

8. Write a program to implement Knapsack problem using greedy method.

9. Write a program to implement Job sequencing with deadlines and Single source shortest path problem using Greedy Method

10. Write a program to implement All pairs Shortest path and 0/1 Knapsack problem using Dynamic Programming

11. Write a program to implement Optimal Binary Search Tree using Dynamic Programming

12. Write a program to implement n-Queen‟s problem and Sum of subsets using backtracking method.

13. Write a program to implement Travelling sales person using branch and bound, dynamic programming.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Raja sekharan,

University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

ELECTRONIC RESOURCES:

1. https://www.geeksforgeeks.org/design-and-analysis-of-algorithms/
2. https://www.programiz.com/dsa
3. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
4. https://ocw.mit.edu/courses/6-046j-design-and-analysis-of-algorithms-spring-2015/

MATERIALS ONLINE:

1. Open-ended experiments
2. Lab Manual