Modern Education Society's
NOWROSJEE WADIA COLLEGE
(Autonomous) NEP

(Affiliated to Savitribai Phule Pune University)

Lab course on

DESIGN AND ANALYSIS OF

ALGORITHMS

CHOICE BASED CREDIT SYSTEM PATTERN

M.Sc. (Computer

science) semester I

2023-24

Design And Analysis of Algorithms -
Assignment Completion Sheet

Sr. No	Assignment Name	Marks
1	Sorting and Searching	
2	Divide and Conquer	
3	Greedy Method	
4	Decrease and conquer and Backtracking	
5	Branch and Bound and Problem Classification	
	Total out of 25- Total out of 10	

Signature of Batch In-charge: _____

Examiner I: _____

Examiner II: _____

Date :_____

Assignment 1: Sorting and Searching

Reading

- ✔ **Data Structures**
- ✔ **Sorting Methods - Bubble Sort, Insertion Sort**
- ✔ **Searching - Linear Search, Binary Search**

Lab Assignments

1. **Write a Scilab program to sort 10 numbers using bubble sort in increasing order.**
2. **Write a Scilab program to sort 5 numbers using insertion sort in increasing order.**
3. **Write a Scilab program to find a number using Linear search. Accept 5 numbers from the user and number to find.**
4. **Write a Scilab program to find a number using Binary search. Accept 5 numbers from the user and number to find.**

Name and Signature of the instructor : _____

Date of Evaluation : _____

Assignment Evaluation:

0. Not Done : ☐   1. Incomplete : ☐   2. Late Complete : ☐

3. Needs Improvement : ☐   4. Complete : ☐   5. Well Done : ☐

Assignment 2: Divide and Conquer

Reading

- ✔ **Data Structures**
- ✔ **Sorting Methods - Merge Sort, Quick Sort**

Lab Assignments

1. **Write a Scilab program to sort 5 numbers using Merge sort in increasing order.**
2. **Write a Scilab program to solve the following problem:**
   Nuts & Bolts Problem (Lock & Key problem) using Quick Sort. Given a set of n nuts of different sizes and n bolts of different sizes. There is a one-one mapping between nuts and bolts. Match nuts and bolts efficiently.
   Constraint: Comparison of a nut to another nut or a bolt to another bolt is not allowed. It means a nut can only be compared with a bolt and a bolt can only be compared with a nut to see which one is bigger/smaller. Another way of asking this problem is, to give a box with locks and keys where one lock can be opened by one key in the box. We need to match the pair.

Name and Signature of the instructor : _____

Date of Evaluation : _____

Assignment Evaluation:

0. Not Done : [   ]   1. Incomplete : [   ]   2. Late Complete : [   ]

3. Needs Improvement : [   ] 4. Complete : [   ]   5. Well Done : [   ]

Assignment 3 : Greedy Method

Reading

✔ **Data Structures**
✔ **Greedy Methods - Job Sequencing.**

Lab Assignments

Let there be N workers and N jobs. Any worker can be assigned to perform any job, incurring some cost that may vary depending on the work-job assignment. It is required to perform all jobs by assigning exactly one worker to each job and exactly one job to each agent in such a way that the total cost of the assignment is minimized. Write a Scilab program to solve this problem.

Name and Signature of the instructor : _____

Date of Evaluation : _____

Assignment Evaluation:

0. Not Done :　　　　　1. Incomplete :　　　　　2. Late Complete :

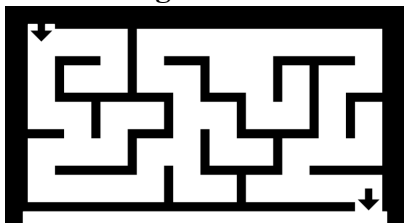3. Needs Improvement :　　　4. Complete :　　　5. Well Done :

Assignment 4 : Decrease and Conquer and Backtracking

Reading

- ✔ **Data Structures**
- ✔ **Depth First Search**
- ✔ **Graph coloring Problem**

Lab Assignments

1. **Write a Scilab program to solve a problem of maze by applying an appropriate algorithm. Write an algorithm for the same along with time complexity in the notebook.**

2. **Suppose we want to make an exam schedule for a university. We have listed different subjects and students enrolled in every subject. Many subjects would have common students (of the same batch, some backlog students, etc). How do we schedule the exam so that no two exams with a common student are scheduled at same time? How many minimum time slots are needed to schedule all exams? This problem can be represented as a graph where every vertex is a subject and an edge between two vertices means there is a common student. So this is a graph coloring problem where the minimum number of time slots is equal to the chromatic number of the graph.**
   Write a Scilab program to solve the above problem.

Name and Signature of the instructor : _____

Date of Evaluation : _____

Assignment Evaluation:

0. Not Done : ☐   1. Incomplete : ☐   2. Late Complete : ☐

3. Needs Improvement : ☐   4. Complete : ☐   5. Well Done : ☐

Assignment 5 : Branch and Bound And Problem Classification

Reading

- ✔ **Data Structures**
- ✔ **Traveling Salesman problem**
- ✔ **Problem Classification**

Lab Assignments

1. **Given a set of cities and distance between every pair of cities, the problem is to find the shortest possible tour that visits every city exactly once and returns to the starting point.**
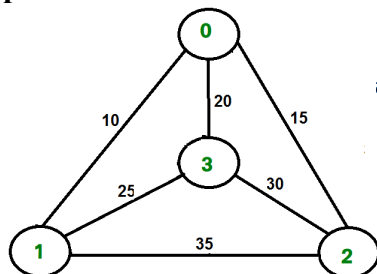
2. **Generate a binary string of length N using branch and bound technique.**
   (Input: N = 3 Output: 000 001 010 011 100 101 110 111 Explanation: Numbers with 3 binary digits are 0, 1, 2, 3, 4, 5, 6, 7 Input: N = 2 Output: 00 01 10 11)

Name and Signature of the instructor : _____

Date of Evaluation : _____

Assignment Evaluation:

0. Not Done : ☐   1. Incomplete : ☐   2. Late Complete : ☐

3. Needs Improvement : ☐   4. Complete : ☐   5. Well Done : ☐