



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME : 19IT405 DESIGN AND ANALYSIS OF ALGORITHMS

II YEAR /IV SEMESTER

Unit 1- INTRODUCTION

Topic 2: Important Problem Types





Brain Storming



1. What is Algorithm?
2. Why it is important?

Problem Types

- Sorting
- Searching
- String Processing
- Graph processing
- Combinatorial problems
- Geometrical problems
- Numerical problems

Sorting

- Rearranging the given items in ordered sequence .
- Sorting makes searching easier: dictionaries, telephone books, class lists and so on are sorted.
- Sorting algorithms: selection sort, bubble sort, merge sort, quick sort, heap sort.

Searching

- To find a given value, called a *search key*, in a *given set*.
- Searching algorithms
 - Sequential search
 - Binary search
 - Hashing
 - Tree-based searches

String Processing

- A string is a sequence of characters from an alphabet
 - Text strings
 - Bit strings
 - Gene sequences-A,C,F,T
- Algorithms:
 - Brute-force string matching
 - Huffman code

Graph Problems

- A graph is a collection of points (vertices) which are connected by lines (edges).
- Real-life applications:
 - Transportation and communication networks
 - Scheduling projects and games
 - Web's diameter.
- Algorithms for graph problems:
 - Graph traversal
 - Shortest-path problem

Combinatorial problems

- Find a combinatorial object such as permutation, a combination, or a subset that satisfies certain criteria (e.g., maximize a value or minimize a cost).
- Examples:
 - Traveling salesman problem
 - Knapsack problem
 - Assignment problem
 - Graph coloring problem

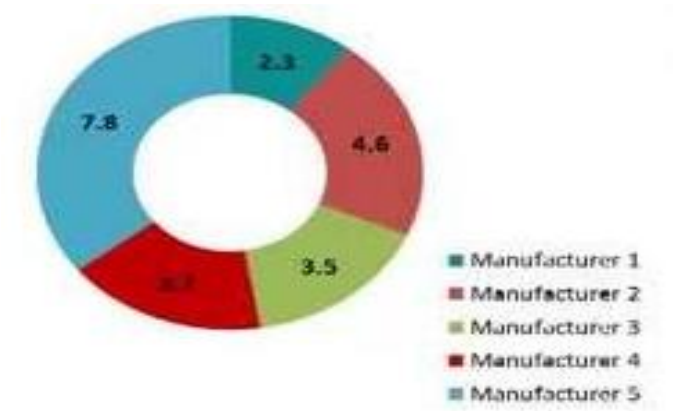
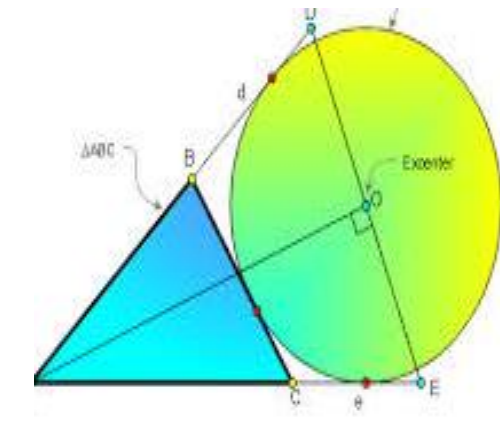
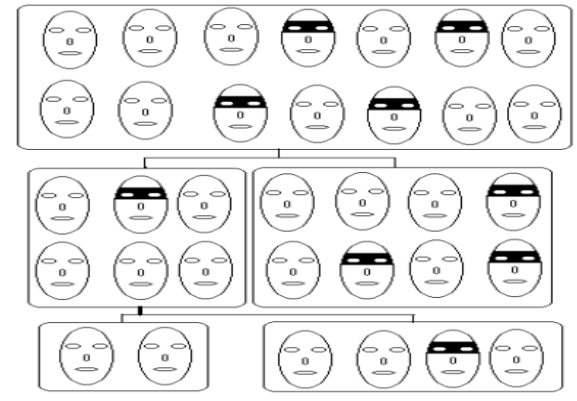
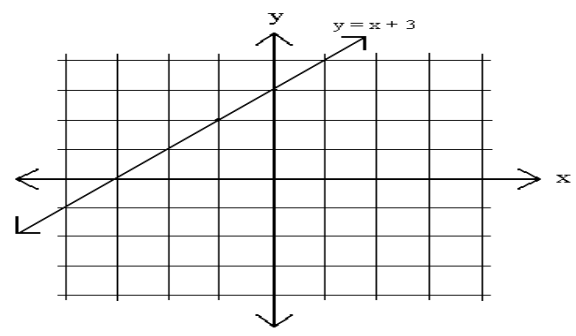
Geometric problems

- Deal with geometric objects such as points, lines, and polygons
- Interesting problems
 - Closest-pair problem
 - Convex hull
 - Brute force
 - Divide-and-Conquer methods

Numerical problems

- Large special area of applications
 - Solving equations and systems of equations
 - Computing definite integrals
 - Evaluating functions.
 - Taylor polynomial
 - Newton's algorithm for computing square roots.

Find the method



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Puzzle

- **ANS:** sorting, searching, string, graph, combinatorial, geometric, numerical



Assessment 1



1. What is algorithm?

Ans : _____

2. Why algorithm effectiveness is important?

Ans : _____





References



TEXT BOOKS

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.

REFERENCES

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.

2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.

3. Donald E. Knuth, “The Art of Computer Programming”, Volumes 1 & 3 Pearson Education, 2009.

4. Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008.

Thank You