



**SNS College of Engineering, Coimbatore - 641107**



# Important problem types

AP/IT

# 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

# Break



# 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



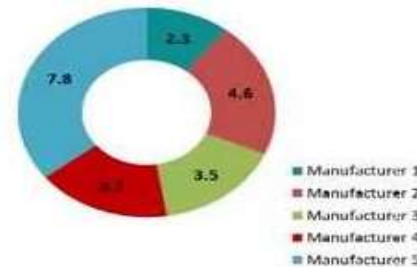
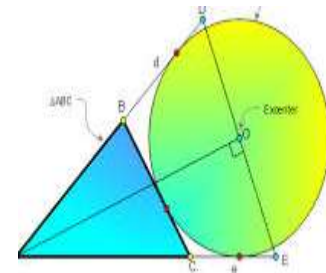
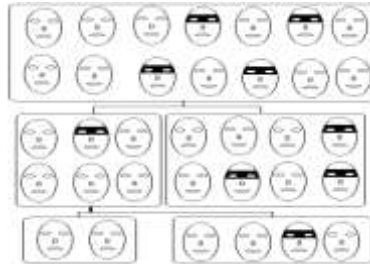
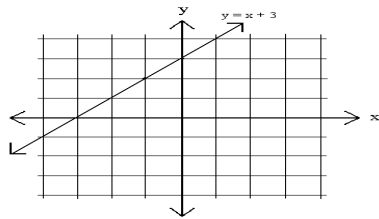
# Geometric problems

- 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 for  **$e^x$**
    - Newton's algorithm for computing square roots.

# Find the method



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# Puzzle

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