



KARACHI EDU | COACHING CENTER NOTES

Unit 1: Problem Solving & Algorithm Designing

Class X Computer Science (Sindh Textbook Board) • Comprehensive Exam Study
Notes & Core Concepts

Subject: Computer Science

Grade: Class X (Matric)

Board: Sindh Board

4-Step Problem Solving Process

1

Define Problem

Diagnose situation to focus on root problem rather than symptoms.

2

Generate Alternatives

Brainstorm multiple viable paths and strategic options.

3

Evaluate & Select

Assess tradeoffs to choose optimal target strategy.

4

Implement & Follow Up

Execute solution and verify expected computational results.

Algorithm Foundations

</> What is an Algorithm?

A finite set of step-by-step instructions or rules followed systematically to solve a specific computational problem.

Key Role: Blueprint for writing accurate, efficient computer programs.

Qualities of a Good Algorithm

1. Precise Input/Output

Inputs and final outputs must be distinctly specified.

2. Unambiguous Steps

Every single instruction must be clear with exact meaning.

3. Language Independent

Written in plain logic, adaptable to any coding language.

Textbook Algorithm Examples

Sum of Two Numbers

Step 1: Start

Step 2: Declare num1, num2, sum

Step 3: Read values num1, num2

Step 4: $\text{sum} = \text{num1} + \text{num2}$

Step 5: Display sum

Step 6: Stop

Average of Three Numbers

Step 1: Start

Step 2: Declare num1, num2, num3, avg

Step 3: Read num1, num2, num3

Step 4: $\text{avg} = (\text{num1} + \text{num2} + \text{num3}) / 3$

Step 5: Display avg

Step 6: Stop

Volume of a Box

Step 1: Start

Step 2: Declare length, width, height, volume

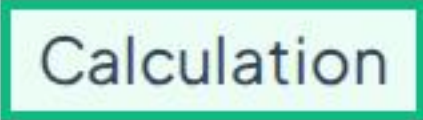
Step 3: Read length, width, height

Step 4: $\text{volume} = \text{length} \times \text{width} \times \text{height}$

Step 5: Display volume

Step 6: Stop

Standard Flowchart Symbols

Symbol Name	Shape Name	Visual Representation	Function / Description
Start / End	Oval / Terminal		Indicates entry or exit point of algorithm.
Input / Output	Parallelogram		Represents reading data or printing outputs.
Process	Rectangle		Performs calculations or memory assignments.
Decision	Diamond		Evaluates True/False or Yes/No condition.
Connector	Circle		Joins different flow lines in complex charts.

Algorithm vs Flowchart

Feature	Algorithm	Flowchart
Format	Textual step-by-step pseudo-instructions.	Graphical/Visual diagram of shapes.
Debugging	Easier to modify text and debug step logic.	Harder to modify once complete diagram is drawn.
Rules	No strict standard rules for text writing.	Follows strict standardized geometric rules.
Role	Serves as pseudo-code for exact coding logic.	Acts as visual blueprint for overall program flow.

Introduction to Data Structures

Linear Data Structures

Data elements are arranged sequentially in single-level memory order. Easy to implement but less efficient in memory utilization.

Examples: Array, Stack, Queue

Non-Linear Data Structures

Elements are connected hierarchically or in networks. Multi-level storage, highly efficient memory utilization.

Examples: Tree, Graph

Linear Types: Array, Stack & Queue

1. Array

Collection of items stored at contiguous memory locations having the same data type.

[10] [20] [30] [40] [50]

2. Stack

LIFO Order (Last In First Out). Insertion and deletion happen from top end only.

LIFO Principle (e.g. Stack of Plates)

3. Queue

FIFO Order (First In First Out). Insertion at rear end, deletion at front end.

FIFO Principle (e.g. Ticket Line)

Tree Data Structure

Hierarchical Organization

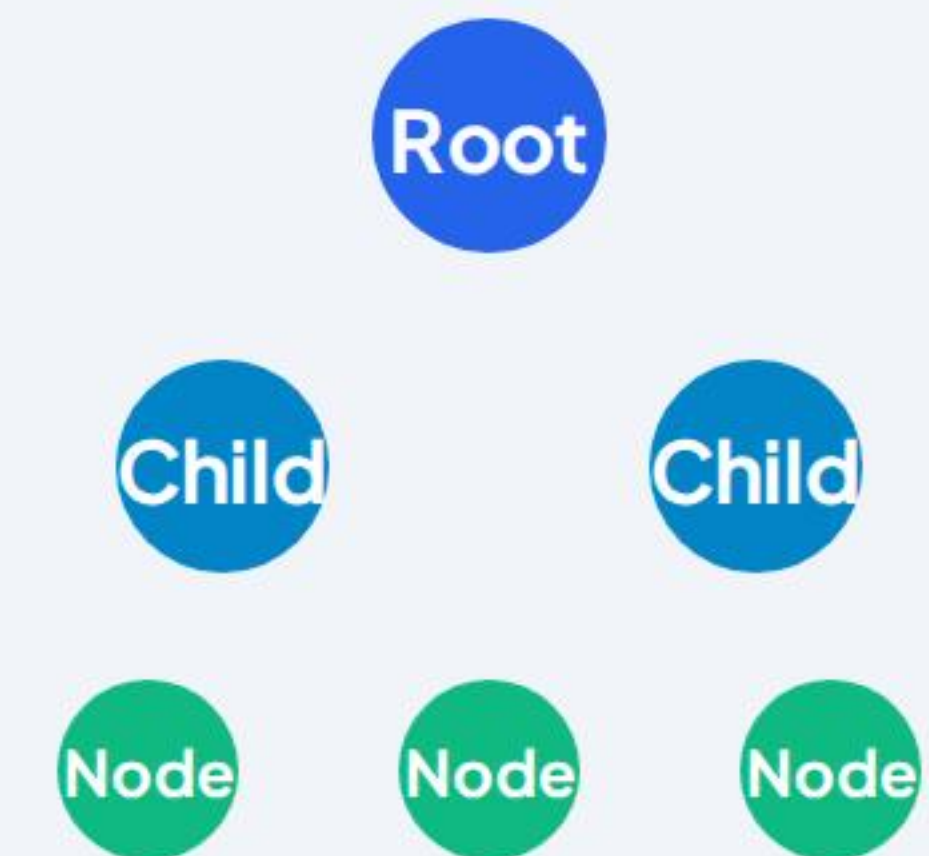
Nodes connected by edges representing parent-child relationships.

Root Node

The primary top-level entry node in a tree collection.

Binary Tree

A special tree where each node has a maximum of 2 child nodes.



Graph Data Structure

Vertices / Nodes

Data elements containing information (e.g. Roll No, Name, Marks).

Edges

Connecting lines between pairs of vertices forming complex networks.

Key Advantage

No hierarchy restrictions; each node can connect to any number of edges.

V1

V2

V3

V4

Sindh Board Exam Key Takeaways

★ High Frequency Topics

Definition: Algorithm & Flowchart distinctions

Symbols: Diamond for Decision, Parallelogram for I/O

Linear DS: Stack (LIFO) vs Queue (FIFO)

Non-Linear DS: Binary Tree max 2 children rule

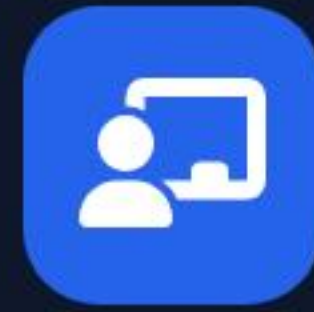
✔ Practical Formulas

Average: $\text{avg} = (n1 + n2 + n3) / 3$

Volume: $\text{vol} = \text{length} \times \text{width} \times \text{height}$

Sum: $\text{sum} = \text{num1} + \text{num2}$

Percentage: $\text{pct} = (\text{obtained} / \text{total}) \times 100$



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Next Unit: Unit 2 – Programming in C++