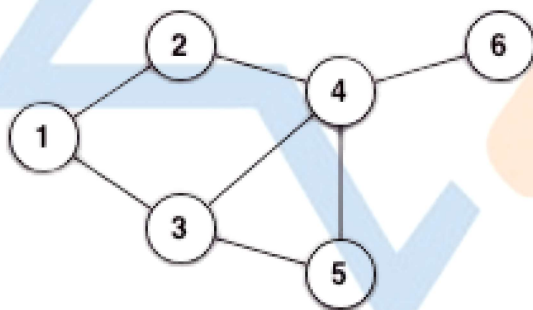


Types of Graphs in DSA

Graphs can be categorized based on **edge orientation**, **edge multiplicity**, **weights**, and **connectivity**. Below are the major types:

1 Undirected Graph

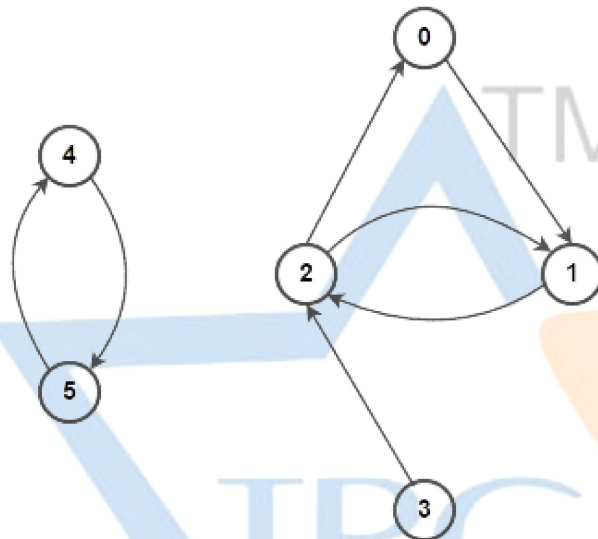
- An **undirected graph** is a graph in which edges have **no orientation**.
- The edge (x, y) is identical to (y, x) .
- **Maximum number of edges** (without loops) = $\frac{n \times (n-1)}{2}$



2 Directed Graph (Digraph)

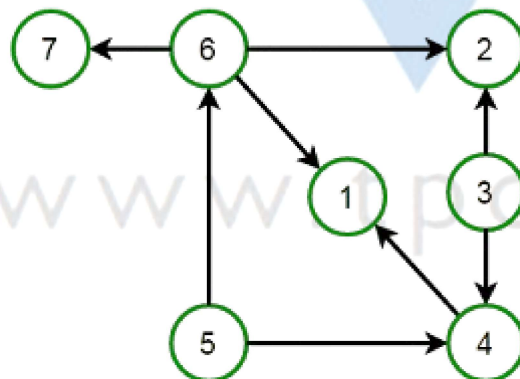
- A **directed graph** is a graph in which edges have **direction**.
- The edge (x, y) is **not the same** as (y, x) .

- Example: Twitter follow graph.



3 Directed Acyclic Graph (DAG)

- A **DAG** is a directed graph that has **no cycles**.
- Widely used in **scheduling, task ordering, and compiler design**.

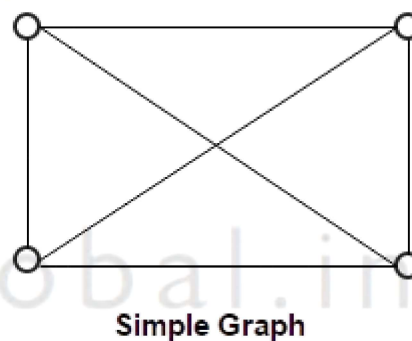
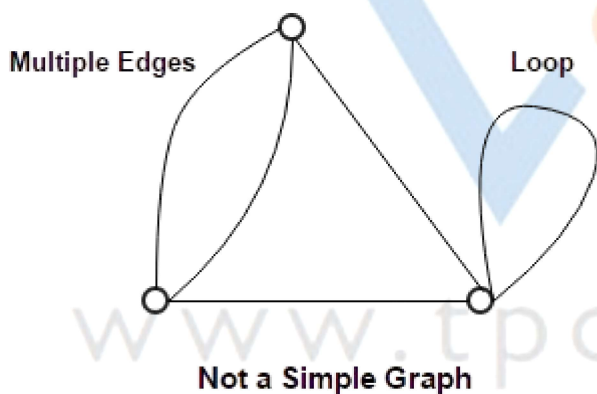


4 Multigraph

- A **multigraph** is an undirected graph where **multiple edges** (parallel edges) and sometimes **loops** are allowed.
- **Multiple edges**: Two or more edges connecting the same pair of vertices.
- **Loop**: An edge that connects a vertex to itself.

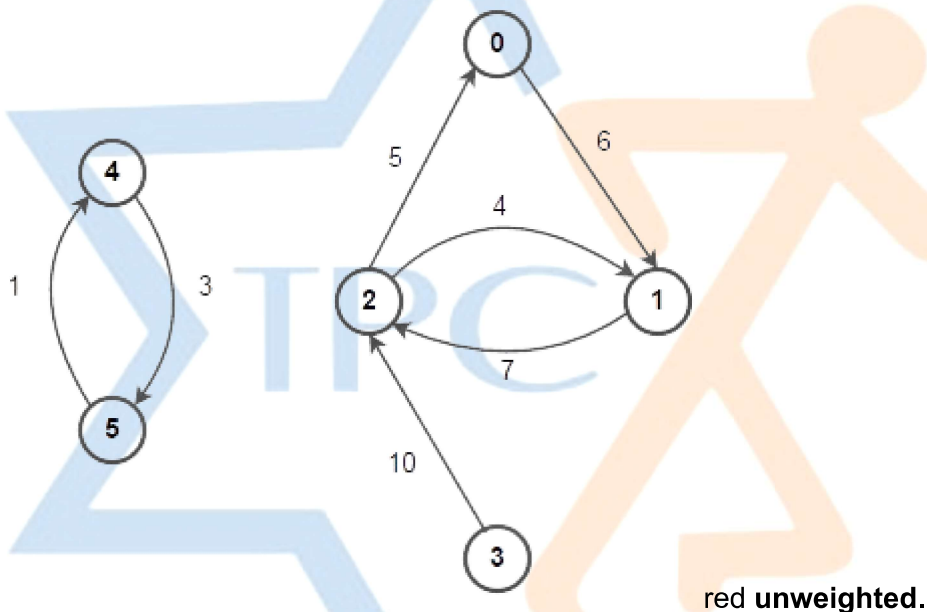
5 Simple Graph

- A **simple graph** is an undirected graph where **no loops** and **no multiple edges** are allowed.
- For n vertices, maximum degree of any vertex = $n-1$.



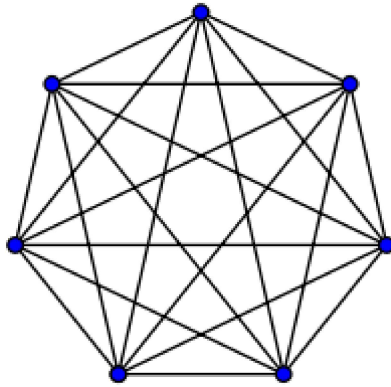
6 Weighted and Unweighted Graph

- **Weighted Graph:** Each edge has a weight (cost, distance, or length).
- **Unweighted Graph:** No values are associated with edges (equivalent to assigning all edges weight = 1).
- By default, unless specified, graphs are considered



7 Complete Graph (K_n)

- A graph in which **every two vertices are directly connected** by an edge.
- For n vertices, total edges = $\frac{n(n-1)}{2}$.



8 Connected and Disconnected Graph

- **Connected Graph:** A path exists between every pair of vertices.
- **Disconnected Graph:** At least one vertex is not reachable from another.

