

Graph:

A graph G consists of a nonempty set V called the set of nodes (points, vertices) of the graph, a set E which is the set of edges of the graph, and a mapping from the set of edges E to a set of vertices of elements of V .

Adjacent Nodes:

Any nodes which are connected by an edge in a graph are called adjacent nodes.

Directed edge:

In a graph $G=(V,E)$ an edge which is directed from one node to another is called a directed edge.

Undirected Edge:

An edge which has no specific direction is called undirected edge.

Directed graph:

A graph in which every edge is directed is called a directed graph.

Undirected graph:

A graph in which every edge is undirected is called undirected graph.

Mixed graph:

A graph in which some edges are directed and some are undirected then this graph is called mixed graph.

Note: Let (V,E) be a graph and let $x \in E$ be a directed edge associated with the ordered pair of nodes (u,v) . then the edge x is said to be initiating or originating in the node u and terminating or ending in the node v . nodes u and v are called the initial and the terminating nodes of the edge x .

An edge $x \in E$ which joins the nodes u and v , whether it be directed or undirected, is said to be incident to the nodes u and v .

Loop:

An edge of a graph which joins a node to itself is called a loop.

Distinct edges:

In case of directed edges, the two possible edges between a pair of nodes, which are opposite in direction are considered distinct.

Parallel edges:

In directed as well as undirected graphs, there are certain pairs of nodes joined by more than one edge, such edges are called parallel edges.

Multigraph:

Any graph which contains some parallel edges is called a multigraph.

Simple graph:

If there is no more than one edge between a pair of nodes then such a graph is called a simple graph.

Weighted graph:

A graph in which weights are assigned to every edge is called a weighted graph.

Isolated node:

A node which is not adjacent to any other node is called an isolated node.

Null graph:

A graph containing only isolated nodes is called a null graph.

Outdegree of node:

In a directed graph, for any node v the number of edges which have v as their initial node is called the outdegree of the node v .

Indegree of node:

In a directed graph for any node v the number of edges which have v as their terminal node is called the indegree of the node v .

Total degree:

The sum of indegree and outdegree of the node is called its total degree.

Path:

any sequence of the edges of a digraph such that the terminal node of any edge in the sequence is the initial node of the edge, if any, appearing next in the sequence defines a path of the graph.

Length of the path:

The number of edges appearing in the sequence of a path is called the length of the path.

Simple path(edge simple):

A path in a digraph in which the edges are distinct is called a simple path.

Elementary path(node simple):

A path in which all the nodes through which it traverses are distinct is called an elementary path.

Cycle(circuit):

A path which originates and ends in the same node is called a cycle.

Elementary cycle:

A cycle is called elementary if it does not traverse through any node more than once.

Acyclic:

A simple digraph which does not have any cycles is called acyclic.

Directed tree:

A directed tree is an acyclic digraph which has one node called its root, with indegree 0, while all other nodes have indegree 1.

Terminal/Leaf node:

In a directed tree, any node which has outdegree 0 is called a terminal /leaf node.

Branch nodes:

In a directed tree, all other nodes rather than leaf node and root node are called branch nodes.

Ordered tree:

If in a directed tree an ordering of the nodes at each level is prescribed, then such a tree is called an ordered tree.

Degree of the node:

The number of subtree of a node is called the degree of the node.

Forest:

A set of disjoint tree is called a forest.

m-ary tree:

If in a directed tree the outdegree of every node is less than or equal to m then the tree is called an m -ary tree.

Full/Complete m-ary tree:

If the outdegree of every node is exactly equal to m or 0 and the number of nodes at level i is $m(i-1)$ then the tree is called a full or complete m -ary tree.