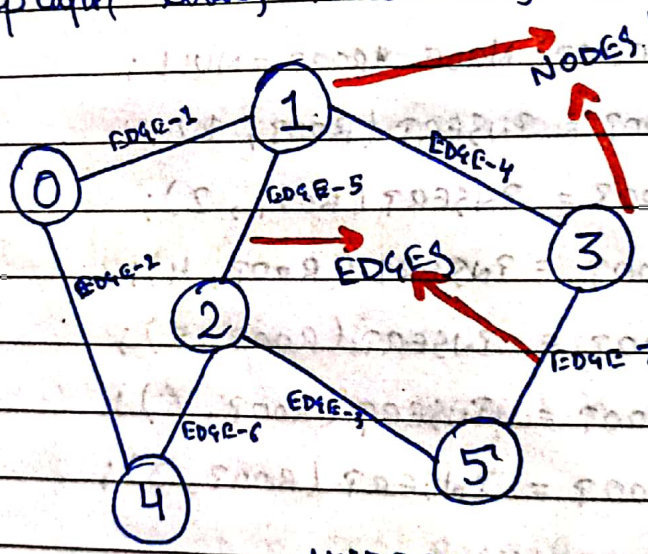
INTRODUCTION TO GRAPHS

Date

→ What is a Graph?

→ Array / Linked lists & stacks → Linear Data Structures.
→ BST & AVL Trees → Non Linear Hierarchical Data Structure.
→ Graph is an example of Non Linear Data Structure.
→ A Graph is a collection of nodes connected through edges.

→ A Graph looks like this:



UNDIRECTED GRAPH

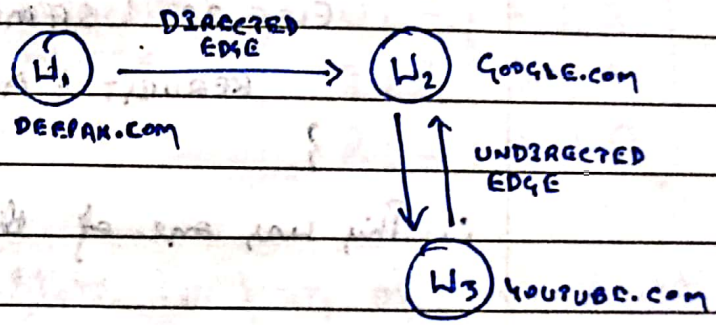
→ Formal Definition of a Graph:

→ A graph G = (V, E) is a collection of vertices and edges connecting these vertices

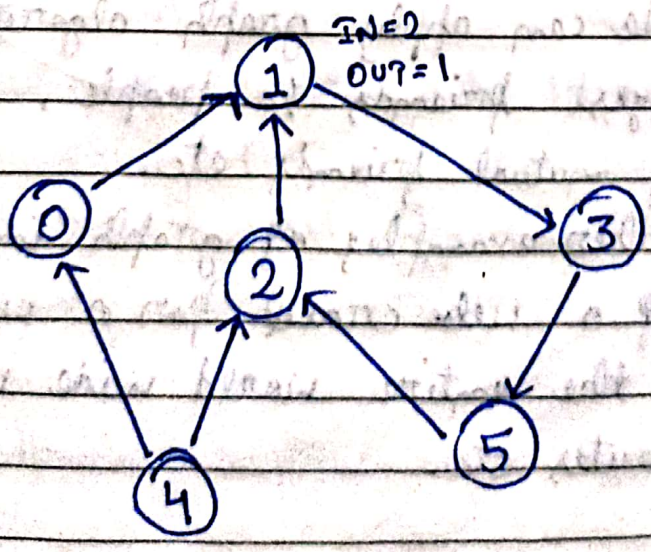
V = { 0, 1, 2, 3, 4, 5 }
E = { {0,1}, {0,4}, {1,3}, {1,2}, {2,4}, {2,5}, {3,5} }

→ Used to model Paths in a city, Social networks, Website backlinks, internal employee networks, etc.
→ A vertex or node is one fundamental unit/entity of which graphs are formed.
→ An edge is uniquely defined by its 2 endpoints.
→ Directed Edge → One way connection.
→ Undirected Edge → Two-way connection.
→ Directed Graph → All directed edges.
→ Undirected Graph → All undirected edges.

E.G.

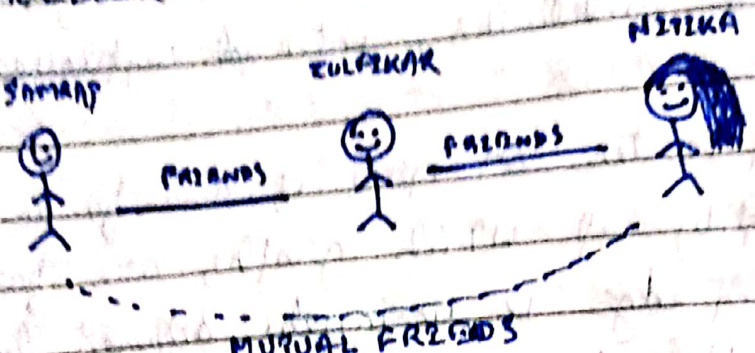


→ Indegree & Outdegree of a node:



→ INDEGREE = No. of edges coming into the node.
→ OUTDEGREE = No. of edges going out of the node.

→ FACEBOOK → A Graph of Users :



→ FaceBook will prompt SAMRAT to make friends with NITIKA as she is in his mutual friends.

```
IF (SAMRAT == SAKHI) {
    REQUEST = DECLINED;
}
ELSE IF (SAMRAT != SAKHI) {
    REQUEST = ACCEPTED;
}
```

∴ This was one of the usage of graphs.

→ Graphs are used to model relationships between nodes.
→ We can apply graph algorithms to suggest friends to people, calculate no. of mutual friends etc.
→ Other examples of graph include result of a web crawl for a website or for the entire world wide web, city routes etc.