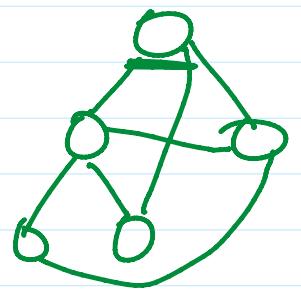
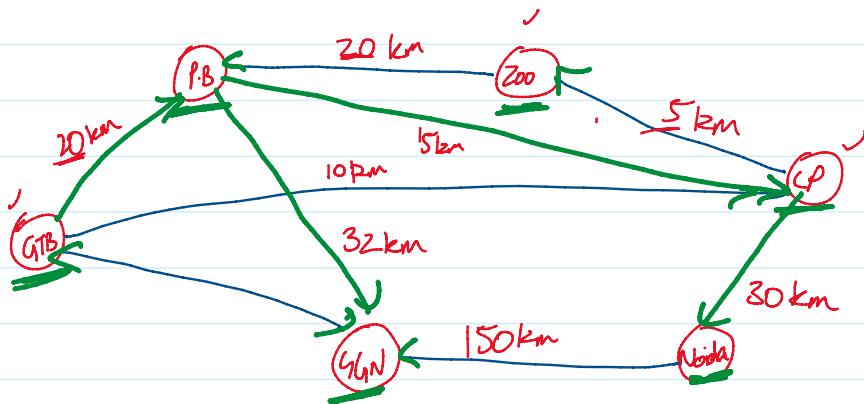
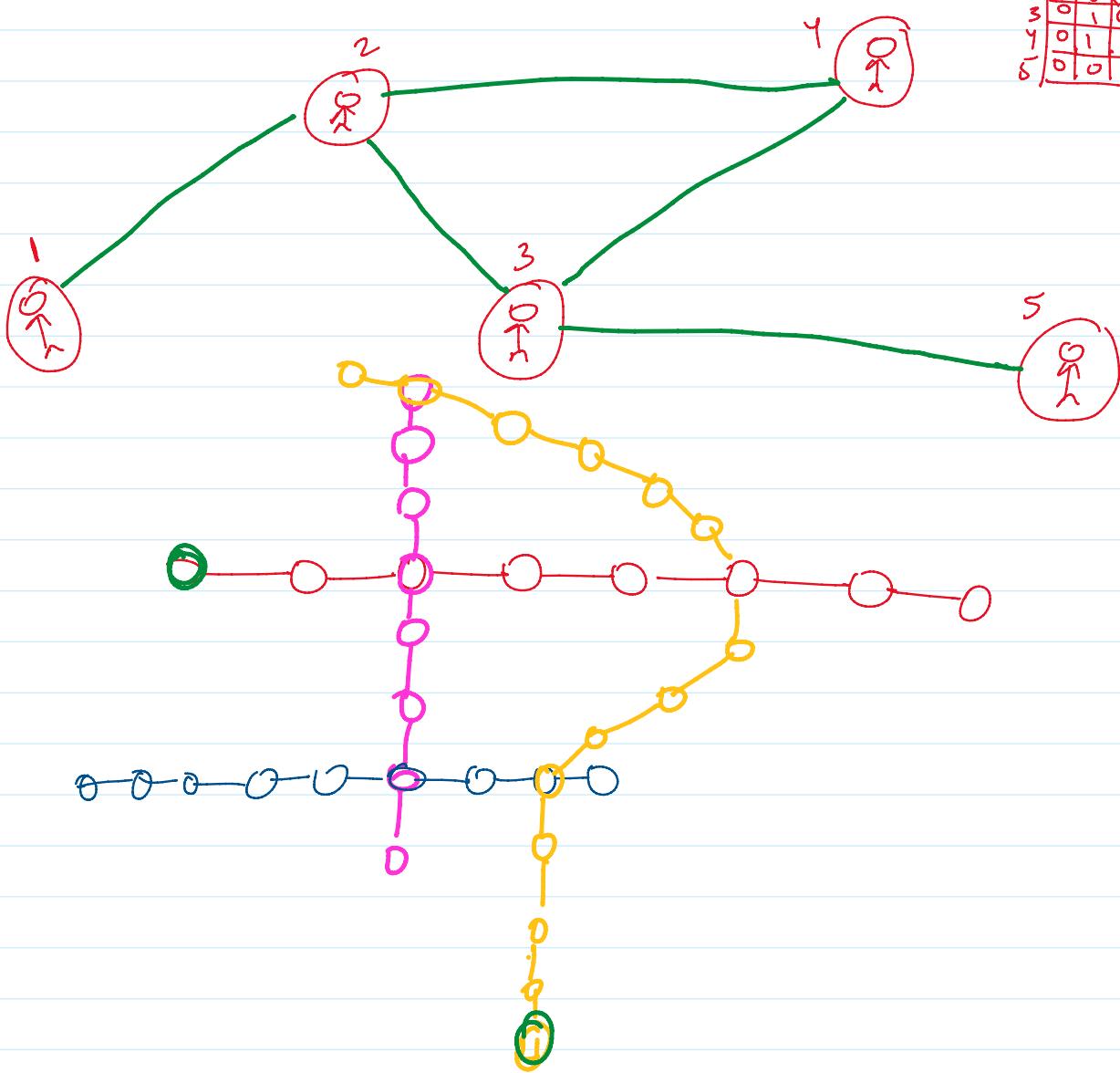


Graph

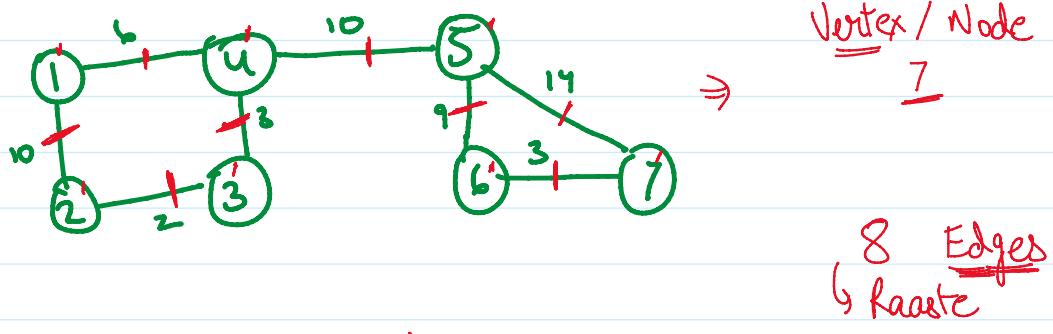
02 April 2023 09:14



FB

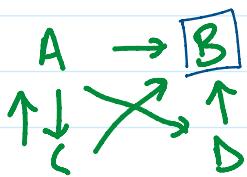


	1	2	3	4	5
1	0	1	0	0	0
2	1	0	1	1	0
3	0	1	0	1	1
4	0	1	1	0	0
5	0	0	1	0	1



Non linear Data Structure

Parent - Child ??
 ↳ Neighbors



	A	B	C	D
A	0	1	1	1
B	0	0	0	0
C	1	1	0	0
D	0	1	0	0

⇒ V^2

Connected?

0 → X

1 → ✓

i) Adjacency Matrix

↳ $V \times V$ Matrix

Total Possible edges kitne hو skte? for V vertices? $M[A][B] \Rightarrow$ edge ✓

$$\begin{aligned} {}^n P_a &= \frac{n!}{(n-a)!} \\ &\text{cyclecity problem} \\ &\text{P}_2 = \frac{n!}{(n-2)!} \\ &\text{A} \rightarrow \text{B} \quad \text{Diff} \\ &\text{B} \rightarrow \text{A} \quad \text{Same} \\ \frac{V!}{(V-2)!} &= \frac{V(V-1)}{2} \\ &= V^2 - V \end{aligned}$$

$$\frac{n!}{(n-a)!a!}$$

F_B A → B B → A

$$\frac{V!}{2!(V-2)!} = \frac{V(V-1)}{2}$$



A B C

A C B

B A C

B C A

C A B

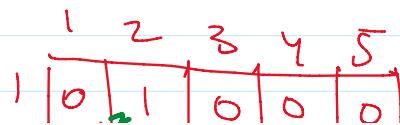
C B A



A B B A

A C C A

B C C B



	1	2	3	4	5
1	0	1	0	0	0
2	1	0	1	1	0
3	0	1	0	1	1
4	0	1	1	0	0
5	0	0	1	0	2

2

i) Weighted

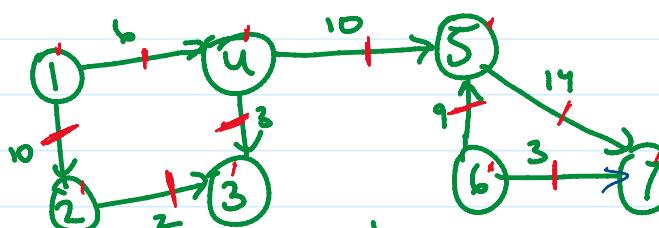
↪ Every edge has some weight defined to it

2) Undirected

↪ Edge ki direction se jarak nahi padega.

3) Directed

↪ !(Undirected)



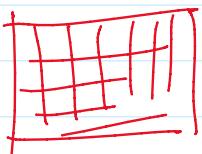
$\downarrow \rightarrow$ Cost
 $0 \rightarrow$ No edge

	1	2	3	4	5	6	7
1	0	10	0	5	0	0	0
2	0	0	2	0	6	0	0
3	0	0	0	0	0	0	0
4	0	0	3	0	10	0	0
5	0	0	0	0	0	0	14
6	0	0	0	0	9	0	3
7	0	0	0	0	0	0	0

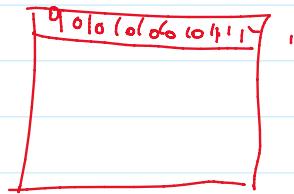
2B \times 2B

Sparse Matrix

2B \times 2B

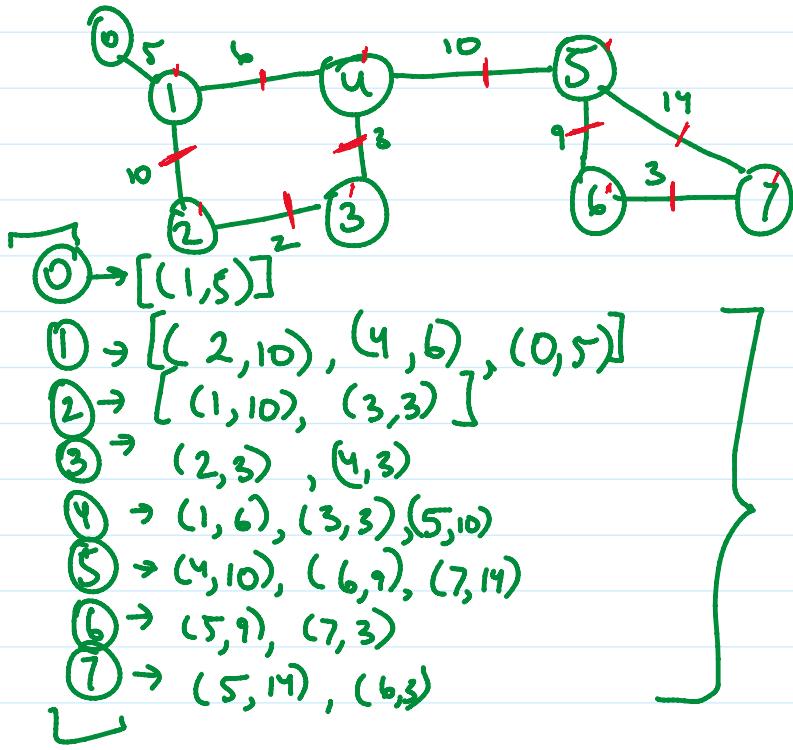


Sparse Matrix



50000

E << V² X

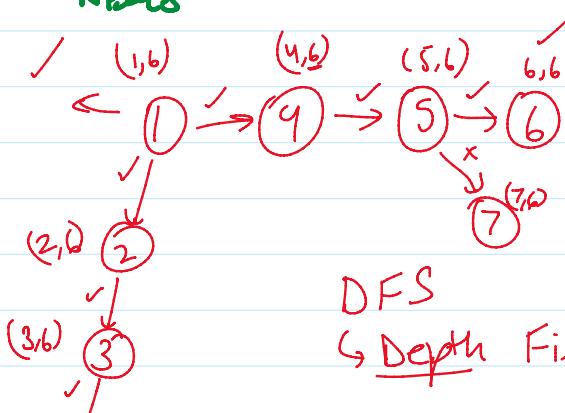
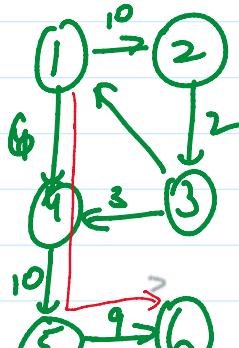


Pair
(nbr, wt)

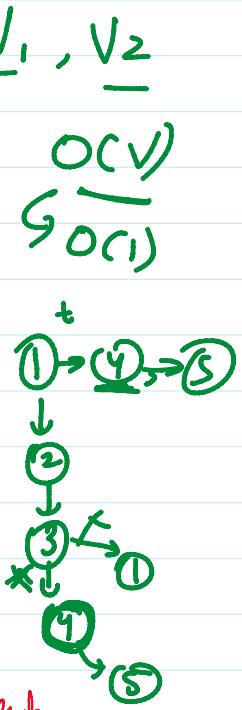
Adjacency List

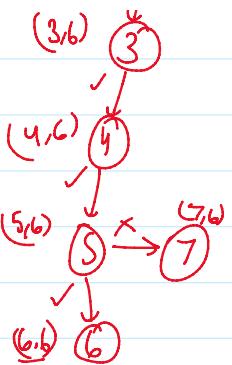
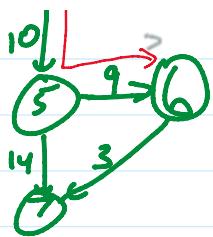
ArrayList < ArrayList < Pair >

HashMap < Node , HashMap< nbr, Pair > >

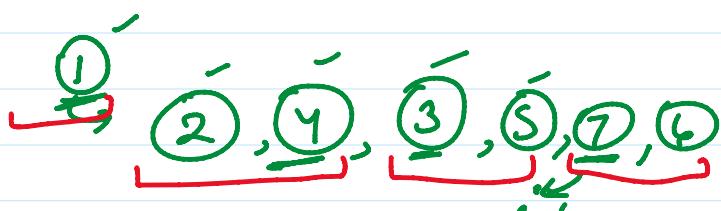
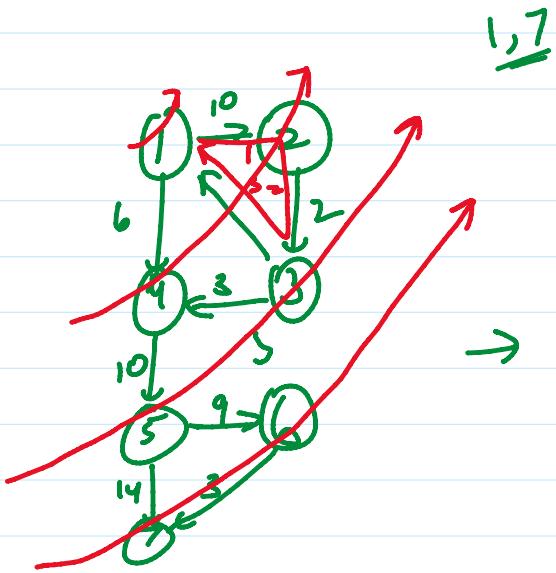
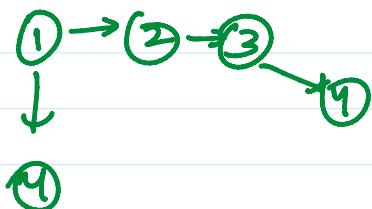


DFS
Depth First Search





↳ Depth First Search



B.F.S

↳ Breadth first search

↳ Radially grow kroge

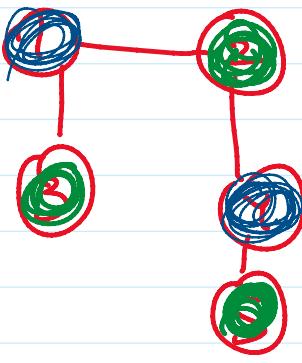


H.W

① Find Path
↳ BFS, DFS

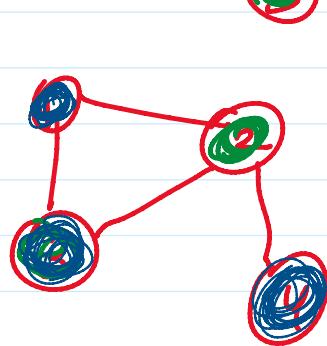
② Detect cycle
↳ BFS, DFS

③ Is Bipartite



③

is Bipartite
BFS, DFS



Graph

→ BFS, Tree
↓ DP

(\oplus) = XOR

$1 \leq 0 \oplus 10$

$2 \Leftarrow$
↓
 10

$100 \Leftarrow 9 \Leftarrow 1$
 $1000 \Leftarrow 8$