lecture 22.   GRAPH.

$G = (V, E)$. V = Set of Vertices.

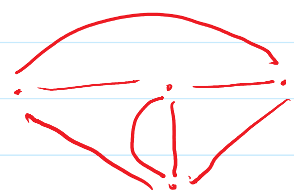
E = Set of Edges.

Each edge is associated with a single or two Vertices.

1- Simple Graph:- ① No loops.

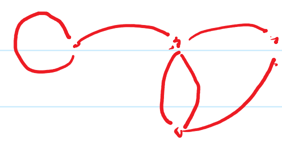
② No multiedges.

2- Multi Graph :- A Graph with multiedges.



3- Pseudograph:- ① May have loops.

② possibly multiedges.



4- Undirected:- ① Edges with no direction. (Undirected).

——— (Undirected).

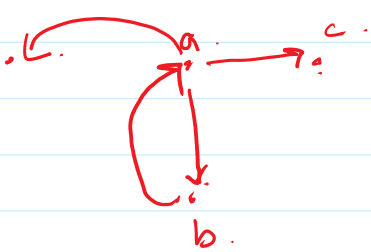
$\longrightarrow$ (Directed).

5- Simple Directed Graph.

① Edges are directed $\rightarrow$.

② No loops.

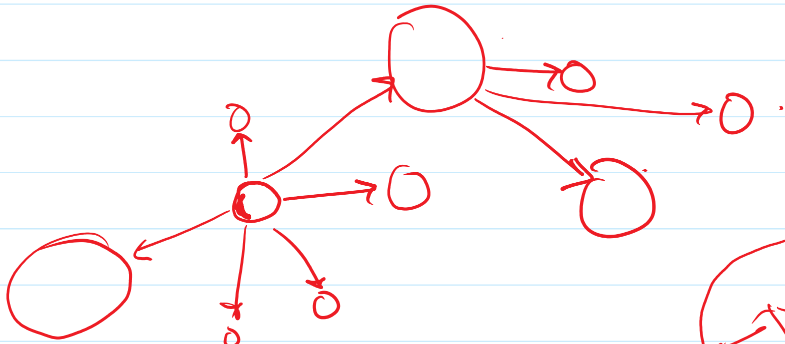
③ No multiedges in the same direction.

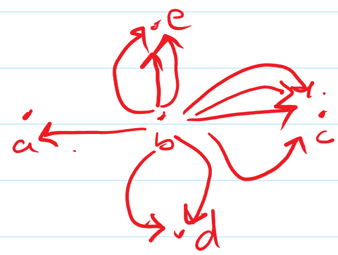


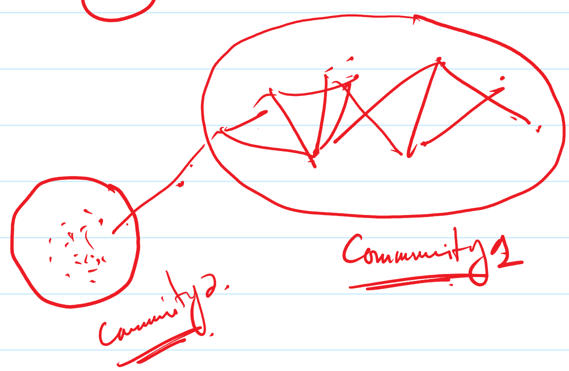
6- Mixed Graph:- A Graph with both directed and

Undirected Edges.

7- multiplicity :- (Multigraph).

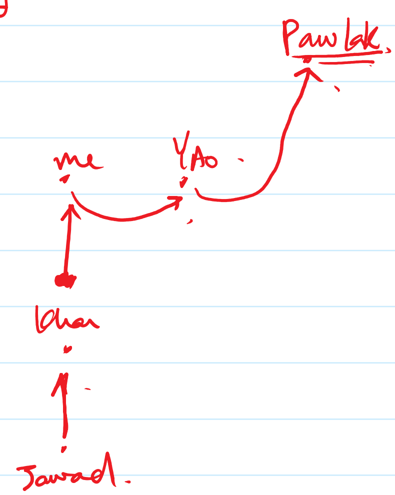






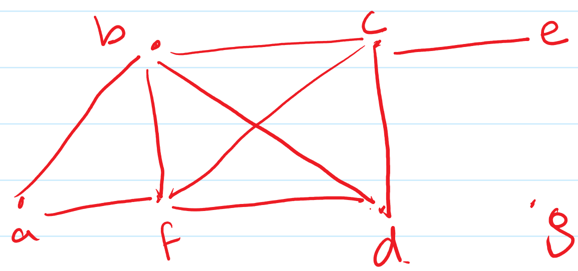
Web Graph :-

Author Graph.

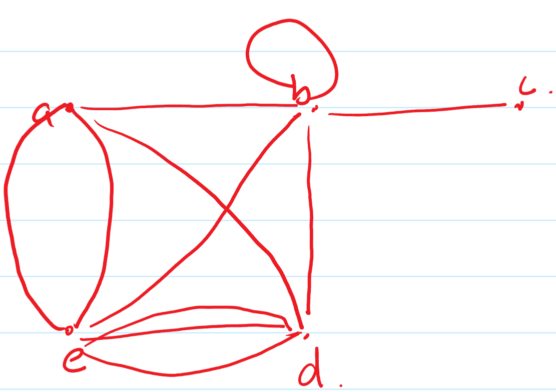


Call Graph :-

Ex2
536



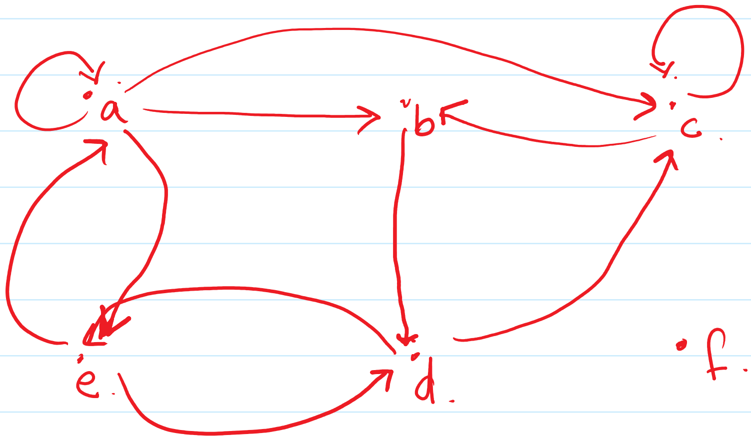
deg(a) = 2.
deg(b) = 4.
deg(c) = 4.
deg(d) = 3.
deg(e) = 1.
deg(f) = 4.
deg(g) = 0.



$G = (V, E)$.

Handshaking theorem:- $2e = \sum_{v \in V} \deg(v)$.

Degrees of Directed Graph:-



Indegree $\deg^-(v)$

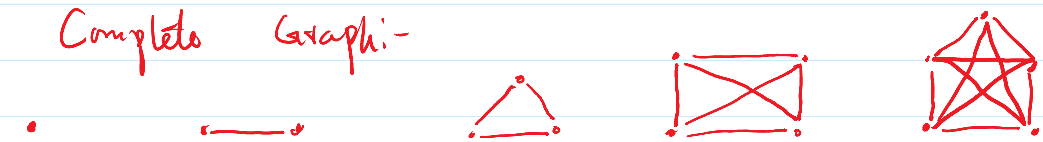
outdegree. $\deg^+(u)$.

Directed Graph.

$$\sum_{v \in V} \deg^-(v) = \sum_{u \in V} \deg^+(u) = |E|.$$

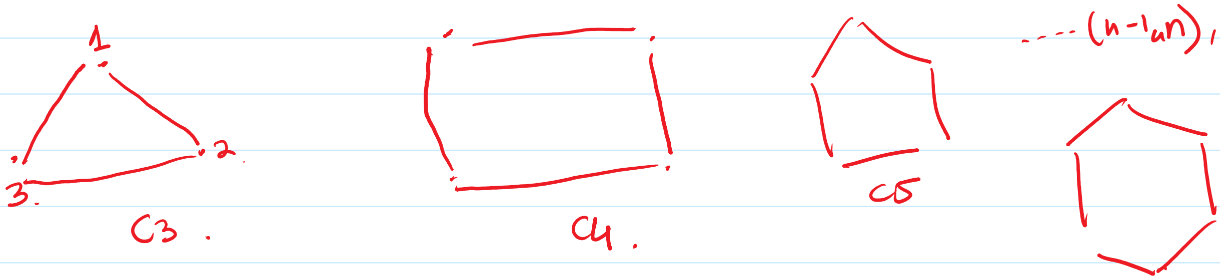
Special types of Graphs.

1- Complete Graph:-



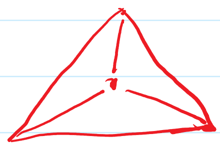
K_1 K_2. K_3. K_4 K_5

2- Cycles. $n \geq 3$. $1, 2, 3, \ldots, n$. $(1,2), (2,3), (3,4), \ldots, (n-1, n), (n, 1)$.

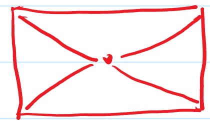


C_3. C_4. C_5 C_6.

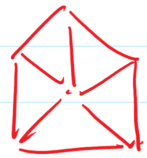
WHEEL :-



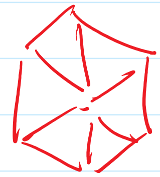
W_3



W_4



W_5



W_6