Important definitions.

① Graph - A graph is an ordered pair $G = (V, E)$ where V is a set of vertices and E is a set of edges.

② A connected graph - A graph is called a connected graph if there is a path from any vertex to any other vertex.

③ Walk - When we traverse a graph in any way we want to, its a walk.

④ Trail - A walk where no edge is repeated but vertices can be repeated.

⑤ Circuit - A trail where start and end vertex is same. No edge is repeated.

⑥ Path - A walk where edges and vertices are not repeated.

⑦ Cycle - A path where start and end vertices are same.

⑧ Eulerian Graph - A graph where all the edges are covered and no edge is repeated.

$T_1$ - G is a Eulerian graph if and only if all vertices of G are even degree.

$T_2$ - G is a connected graph having exactly 2 vertices of degree 3, then G contains a Eulerian path b/w those two vertices.

④ Hamiltonian Graph.

→ A connected graph is Hamiltonian if there is a cycle which includes every vertex of G and cycle is called Hamiltonian.

→ $T_1$ - If G is a graph with n vertices where $\deg(x) + \deg(y) \geq n$ for each pair of non adjacent vertices x and y then the graph is Hamiltonian.

⑤ Isomorphic Graphs.

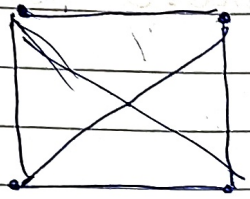
Let $G_1 = (V_1, E_1)$ and $G_2 = (V_2, E_2)$

If there exists a bijective function $f: V_1 \to V_2$ with $\{a, b\} \in E_1$ iff $\{f(a), f(b)\} \in E_2$

$\{a, b\}$ is an edge of $G_1$
$\{f(a), f(b)\}$ is an edge of $G_2$

Denoted by $G_1 \cong G_2$

(10) Planar Graph - If it is possible to draw the diagram of a given graph in such a way that 2 edges ~~dont~~ intersect each other then its a planar graph.



(11) Plane Graph - The diagram of a graph drawn when no 2 eages intersect each other.

(12) Tree - A connected graph which doesn't have a cycle.

(13) Terminal node - A vertex of degree 1 in tree is called as Terminal node or leaf.

(14) Internal node - A vertex of degree greater than 1.

→ $T_1$ - In a tree there is only one path for every pair of vertices.

→ $T_2$ - A tree with n vertices has (n-1) edge

→ A binary tree is a tree which has no more than 2 branches is called binary tree.

→ Has exactly one vertex of degree 2, rest of degree 1 and 3.

→ All vertices with degree 1 are is called pendant vertices.

→ All vertices of degree 2 or 3 are called non-pendant vertices.

→ No. of pendant vertices = $(n+1)/2$

→ No. of non-pendant vertices = $\lfloor (n+1)/2 \rfloor + 1$

→ Max. and min height

Max = $\frac{(n-1)}{2}$

Min $\log_2 \lceil n+1 \rceil - 1$

Q. $n = 11$

$$\text{Max } H = \frac{n-1}{2} = \frac{11-1}{2} = 5$$

$$\text{Min Height} = \log_2(n+1) - 1$$

$$= \lceil 2.58 \rceil = 3.$$

→ A sequence is an ordered set using 0s and 1s to create or decode a message. Also used in forming binary trees.

Eg. $e = \{00, 001, 01, 010, 11, 111\}$