

Graph :

Ordered pair of vertices and edges.

V – non empty set

E – subset of $P_2(v)$, can be an empty set

• Example of graph :



Adjacency :

 $u, v \rightarrow adjacent if (u, v) \in E$

e1, e2 _____ adjacent if they have a vertex in common Incidence :

It is the point where an edge meets a vertex.

Example :

When current is incident with a switch or some connection the system will start to work.

Sub graphs :

India – Main graph (V, E) Tamil Nadu – Sub graph (W, F) V – Places ; E – Roads ; W & F are subsets of V & E respectively.

India map – Main graph

Tamil Nadu map – Sub graph

Spanning sub graph :





Friends – Graph

When there arises a problem btw A & C [Spanning sub graph]

Induced Sub graph:

Dora.....







Half way through the program......(sub graph)







Another Example......(vertex induced sub graph)

ADMK – Graph



ADMK

Here the members are the vertices and they remain as the same but the connections (edges) are cut btw them.... Isomorphism : Examples...









Degree :



Degree of the first pic is 8......Similarly degree of the flower can also be calculated.



K – Regular Graph:

- Every vertex has the same degree K.
- Examples.... Prism, Garlic

Complete Graph:

- Every vertex is adjacent with all other vertices of the graph.
- Example..... Family.



- Father
- Mother
- Son
- o Daughter
- Grandfather
- Grandmother

Walks and Sub graphs :

Sequence of vertices and edges.

Example:



Another example is,

Victims of some calamities – Vertices

Sources, peoples, NGO's connecting us and the victims - Edges



Trail – Distinct Edges Path – Distinct Vertices

Cycles in Graph:

Starting and the ending point will be the same.

Examples.....



Cut Vertices:

On removal of the cut vertex the graph becomes disconnected.



Cut Edge:

Removal of the cut edge will disconnect the graph.



Teachers B.Sc Degree Students

Eulerian Graph :

Eulerian trail – Trail that contains all the edges of the graph.

Eulerian graph – Graph that contains a closed eulerian trail.

Hamiltonian Graph :

Hamiltonian path – A path in a graph G is called a hamiltonian path if it contains every vertex of G.

Hamiltonian cycle – Graph that contains a closed hamiltonian cycle. **Example:** Knight tour...



Try this......Guide this knight to move around the board so that it can go to each cell but not repeating the cells which it had already crossed.....



Knight tour.....Eureka.....

| 34 | 51 | 32 | 1 | 38 | 63 | 20 | 3 |
|----|----|----|----|----|----|----|----|
| 31 | 16 | 35 | 50 | 19 | 2 | 39 | 62 |
| 52 | 33 | 14 | 17 | 64 | 37 | 4 | 21 |
| 15 | 30 | 49 | 36 | 5 | 18 | 61 | 40 |
| 48 | 53 | 26 | 13 | 44 | 57 | 22 | 7 |
| 29 | 12 | 45 | 56 | 25 | 6 | 41 | 60 |
| 54 | 47 | 10 | 27 | 58 | 43 | 8 | 23 |
| 11 | 28 | 55 | 46 | 9 | 24 | 59 | 42 |

Example of Hamiltonian and Eulerian graphs:



Network connections. i.e., connectivity through social medias.

Relay in athletics is also an example.

Weighted graphs:

- Blueprint of a house
- Route map



Bipartite graph:

A graph G being partitioned into two subsets such that no two vertices in the same subset are adjacent is called a bipartite graph.

EXAMPLES:

- i. Family Graph (G)
 - A = { Brothers and their children }
 - B = { Sisters and their children }
- ii. G = { Participants of a sports meet }
 - A = { students from diff schools participating in 100 m dash }
 - B = { students from diff schools participating in 200 m dash }

Trees :

Tree is a connected acyclic graph.

Examples:



