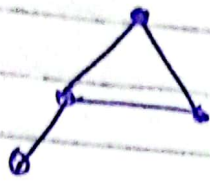


Trees

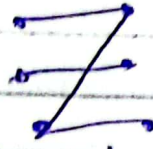
Special graphs without loop & circuit:



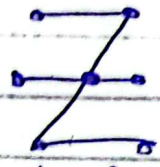
closed graph is known as circuit which is not necessary for trees:



Tree:



Not a tree

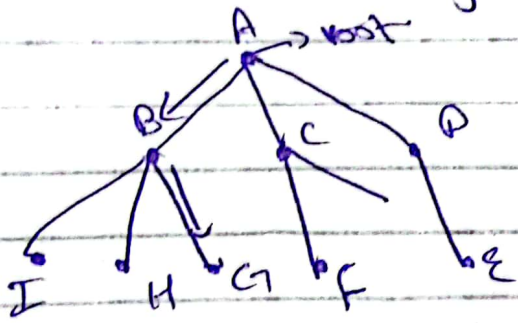


tree

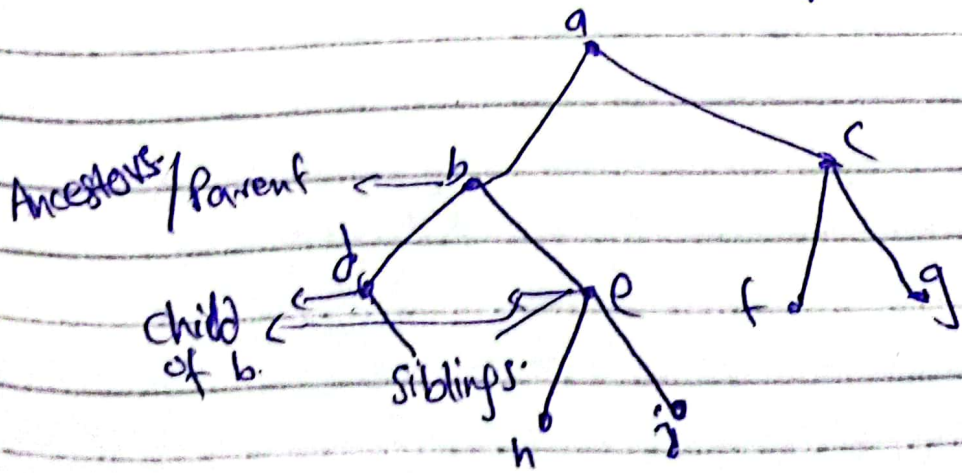
A tree is a connected undirected graph with no simple circuits:

Rooted trees:

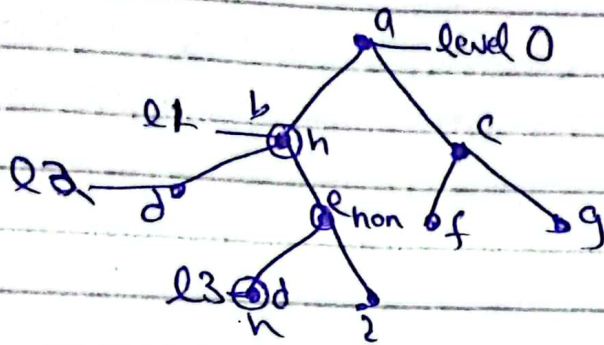
Once a vertex of a tree has been designated as the root of the tree, it is possible to assign direction of each of the edges.



G has unique path:-



① Level ② Height of node ③ Depth ④ Leaf nodes.



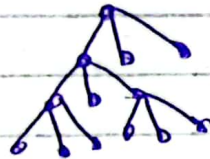
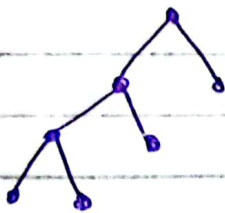
height of b is 2.
depth of h is 3.

height is from bottom to top & dept is from top to bottom.

→ types of trees

① Binary tree:-
at most 2 child

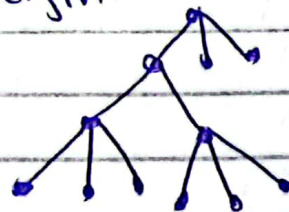
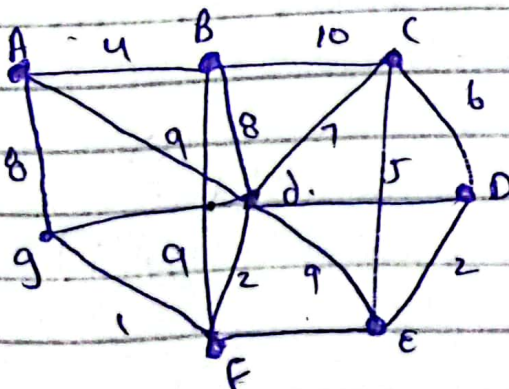
② Tertiary tree
at most 3 child:-



m-ary tree.
 $m = 2, 4, 5, 6$

Properties of trees:- ① Spanning Tree.

↓
length.

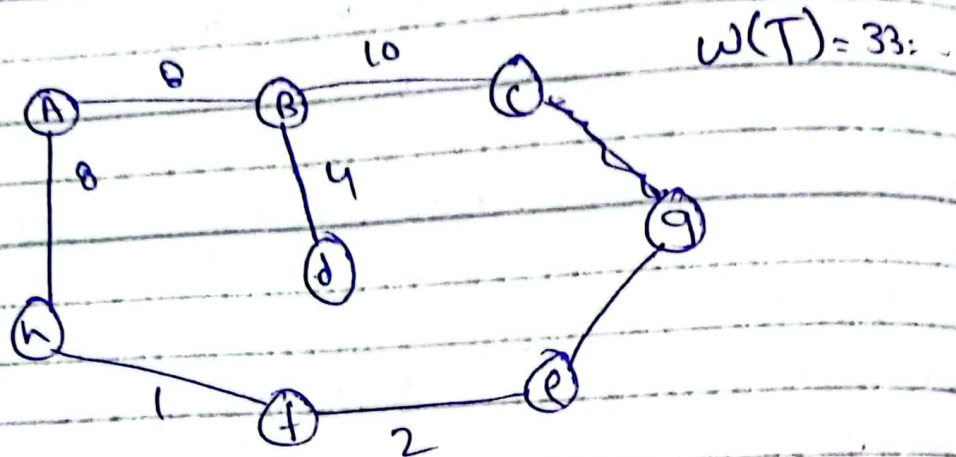


house of 7

Spanning tree is used for roads construction.

Define:-

Spanning tree of a graph is a subgraph that contains every vertex & the subgraph is a tree.



Minimum Spanning tree:-

with minimum length

It is tree that contains every vertex.

Algorithm:- to find Minimum Spanning tree.

vertex in tree (MST)

Remaining vertices

illustration.

A()

B(A, 4)

C(A, 8)

D(F, 1)

E(C, 2)

G(F, 2)

E(F, 5)

~~B(A, 4)~~, C(A, 8)

~~C(A, 8)~~, ~~E(B, 10)~~, ~~D(B, 8)~~

D(C, 2), ~~F(C, 10)~~, ~~E(B, 4)~~

E(F, 5), D(E, 2), G(F, 2)

E(F, 5), ~~G(F, 2)~~

E(F, 5)

A

A 4 B

A 4 B D

A 4 B D E

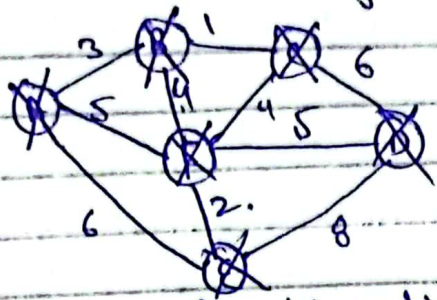
A 4 B D E F

A 4 B D E F G

A 4 B D E F G

$w(T) = 22$

Example we are going to solve.



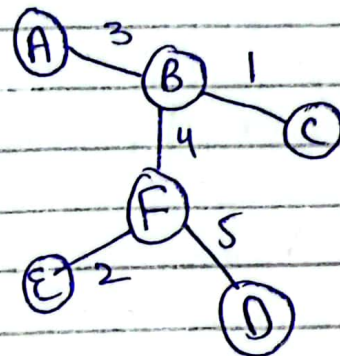
Vertex

Remaining vertices.

A()
B(A, 3)
C(B, 1)
F(B, 4)
E(F, 2)
D(F, 5).

~~E(A, 6), B(A, 3), F(A, 5)~~
~~E(A, 6), F(B, 4), C(B, 1)~~
~~D(C, 6), F(B, 4), E(A, 6)~~
~~E(F, 2), D(F, 5)~~
D(F, 5)

illustration)

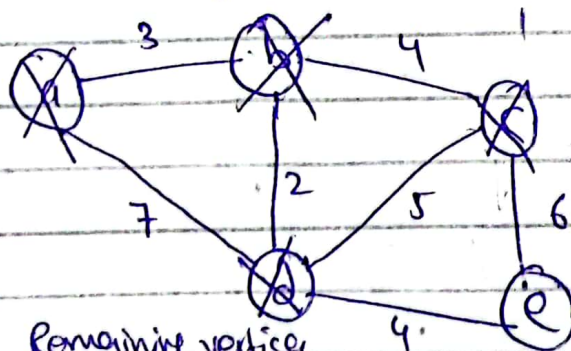


Excellent

$w(T) = 15$.

Source..

Single ~~Short~~ Shortest Path Problem (Algorithm)
Dijkstra..



Vertices

Remaining vertices

a()

~~b(a, 3)~~ ~~d(a, 7)~~,
~~c(a, ∞)~~ ~~e(-∞)~~

b(a, 3)

~~c(b, 7)~~ ~~d(b, 5)~~ ~~e(-∞)~~

d(b, 5)

~~c(b, 7)~~, ~~e(d, 9)~~

c()

e()

d()

illustration