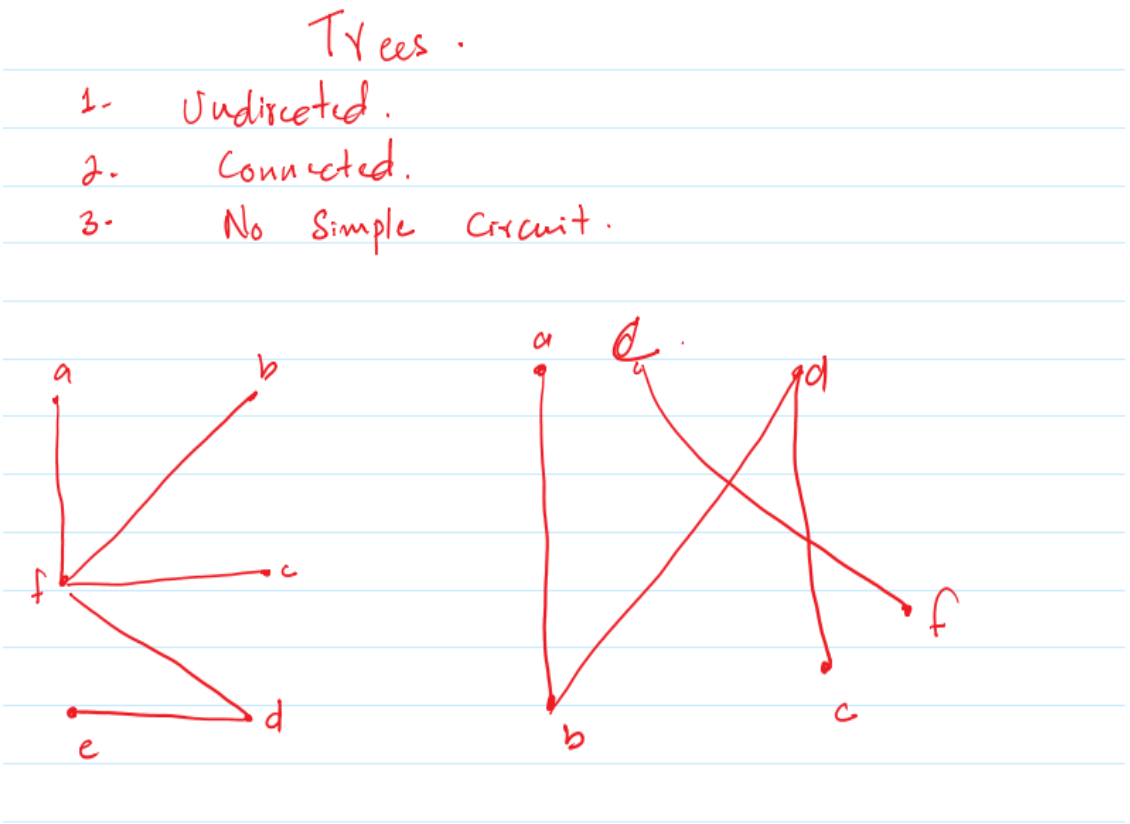
Discrete Lecture # 27

- Trees
  - Undirected
  - Connected
  - No simple Circuit



- Rooted Tree :
  - Tree with one vertex as root and other vertices are directed away from it

Rooted Tree:- A tree in which one Vertex is designated as the root & every edge is directed away from it.

Parent :- U is the parent of V.
the edge starts from U & ends at V.

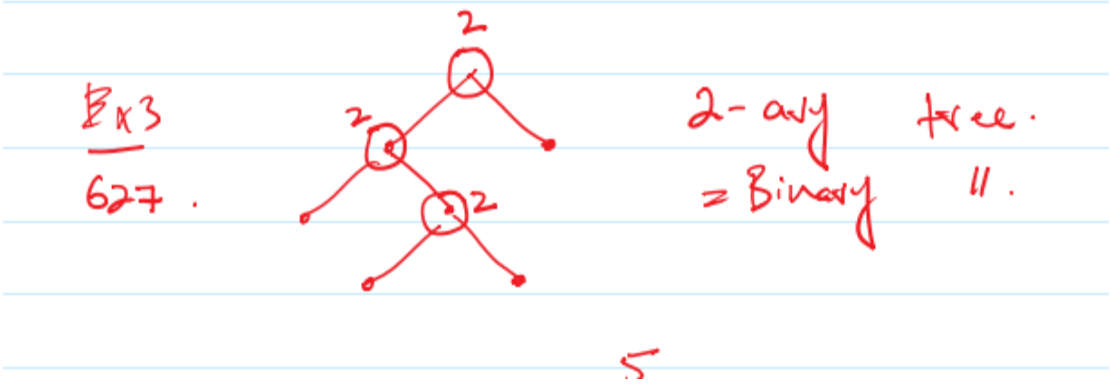
Child :- U is the child of V.
the edge starts with V & end at U.

Sibling :- Vertices having Common parent.

- M-Array Tree
  - The tree that can have maximum of M number of leaf nodes or childs

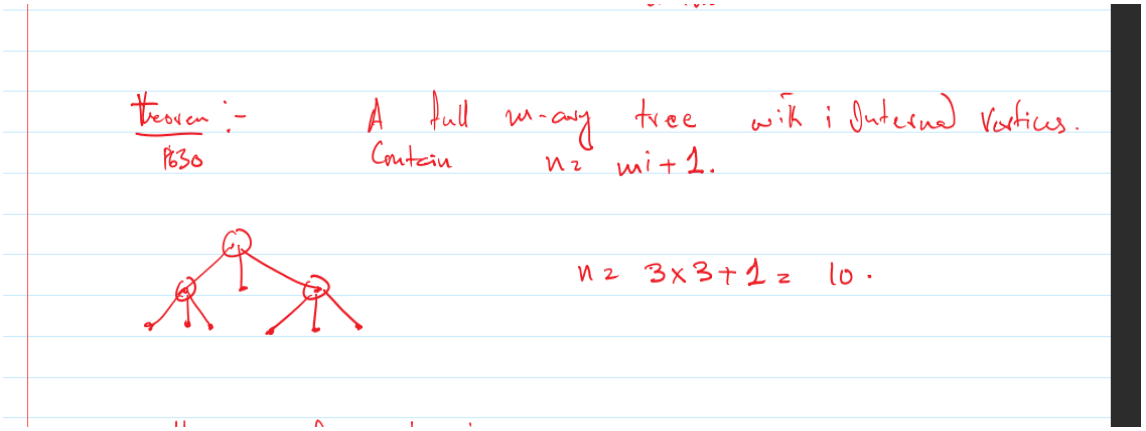
m-ary :- if every Internal Vertex has no more than m Children

  -
  - For example 2-array tree

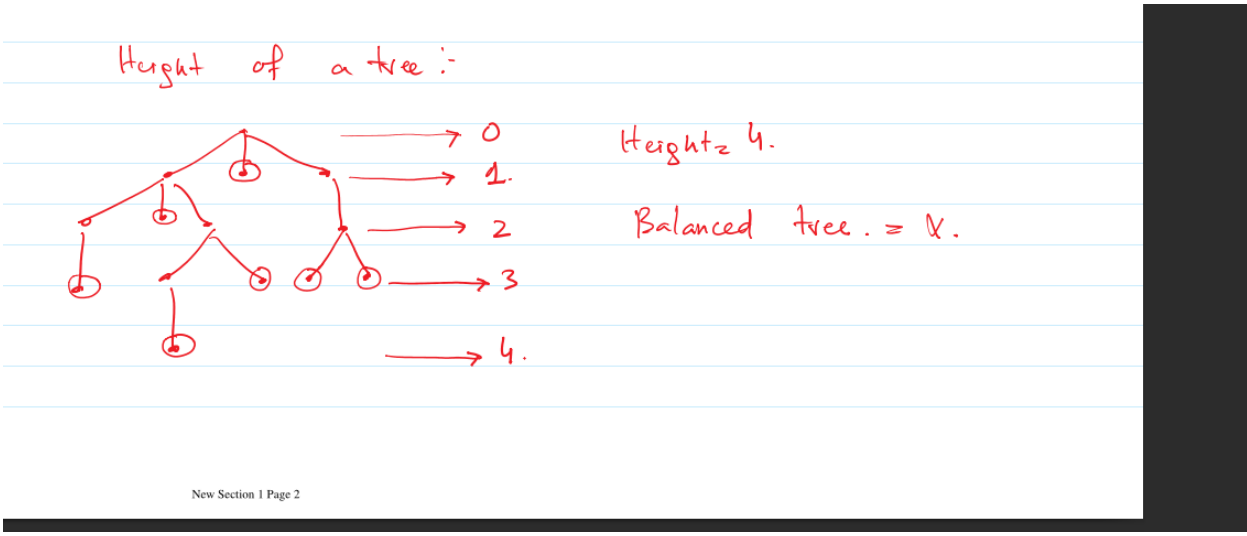


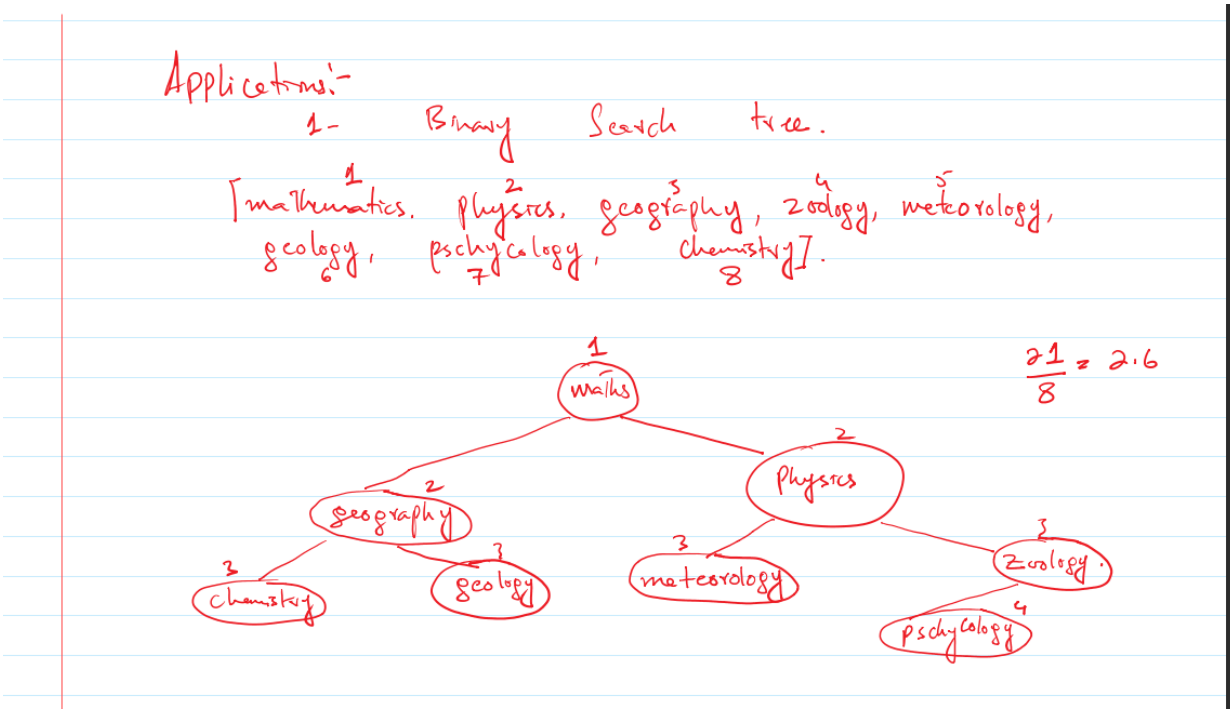
- Theorem :
  - A tree with n vertices will have n-1 edges

    - Tree has 10 vertices and 9 edges
    - N vertices (10 vertices)
    - N-1 edges (10 - 1 edges)
- Full n - array tree
  - Every parent has n childs
  - Theorem :



- Height of a tree :

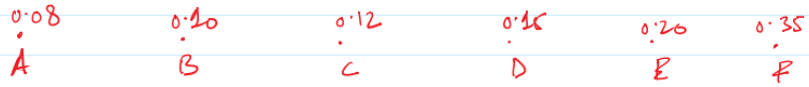
- 

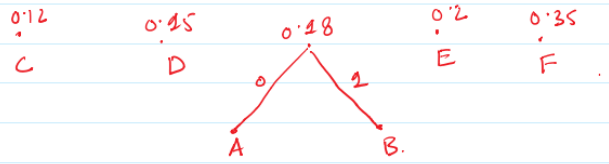
- BINARY SEARCH TREE (BST)
  - Make the first root
  - Now when you insert another word if it is lesser than the root insert at left or insert at right
  - If the level is filled do it further more with the same rules
  - 

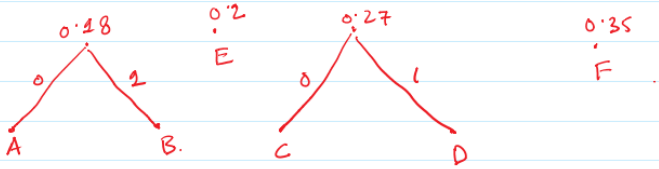
- HUFFMAN ENCODING :
  - Write all the vertices and its probabilty , then add the two minimum probability vertices and make rooted tree out of it ,

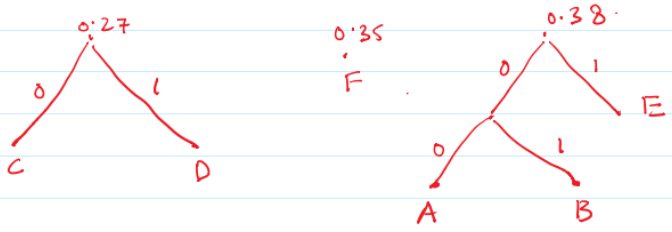
- Keep the process going until you make one whole rooted tree and the probability of root vertex becomes 1

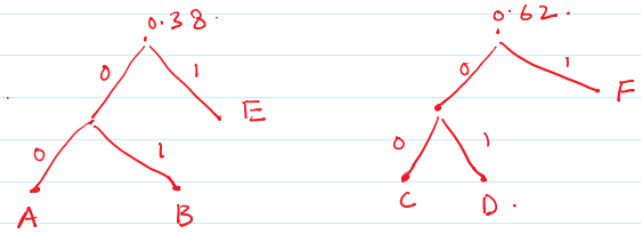
Huffman Coding :-

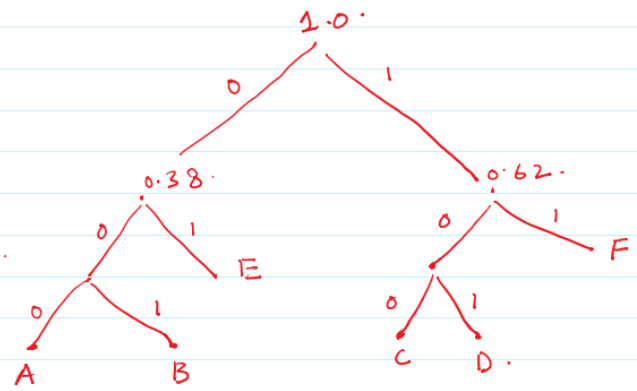












$\frac{16}{6} = 2.66$

A = 000

B = 001

C = 100

D = 101

E = 01

F = 11.