

# Data Science & AI



Artificial Intelligence

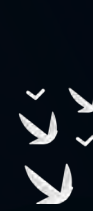
**Searching Algorithms**

**Lecture No. 02**



**By-Sudhanshu Sir**

# Recap of Previous Lecture



Topic

BFS

Topic

DFS

Topic

Topic

Topic

# Topics to be Covered



Topic

Uniformed Search

Topic

Depth Limited Search

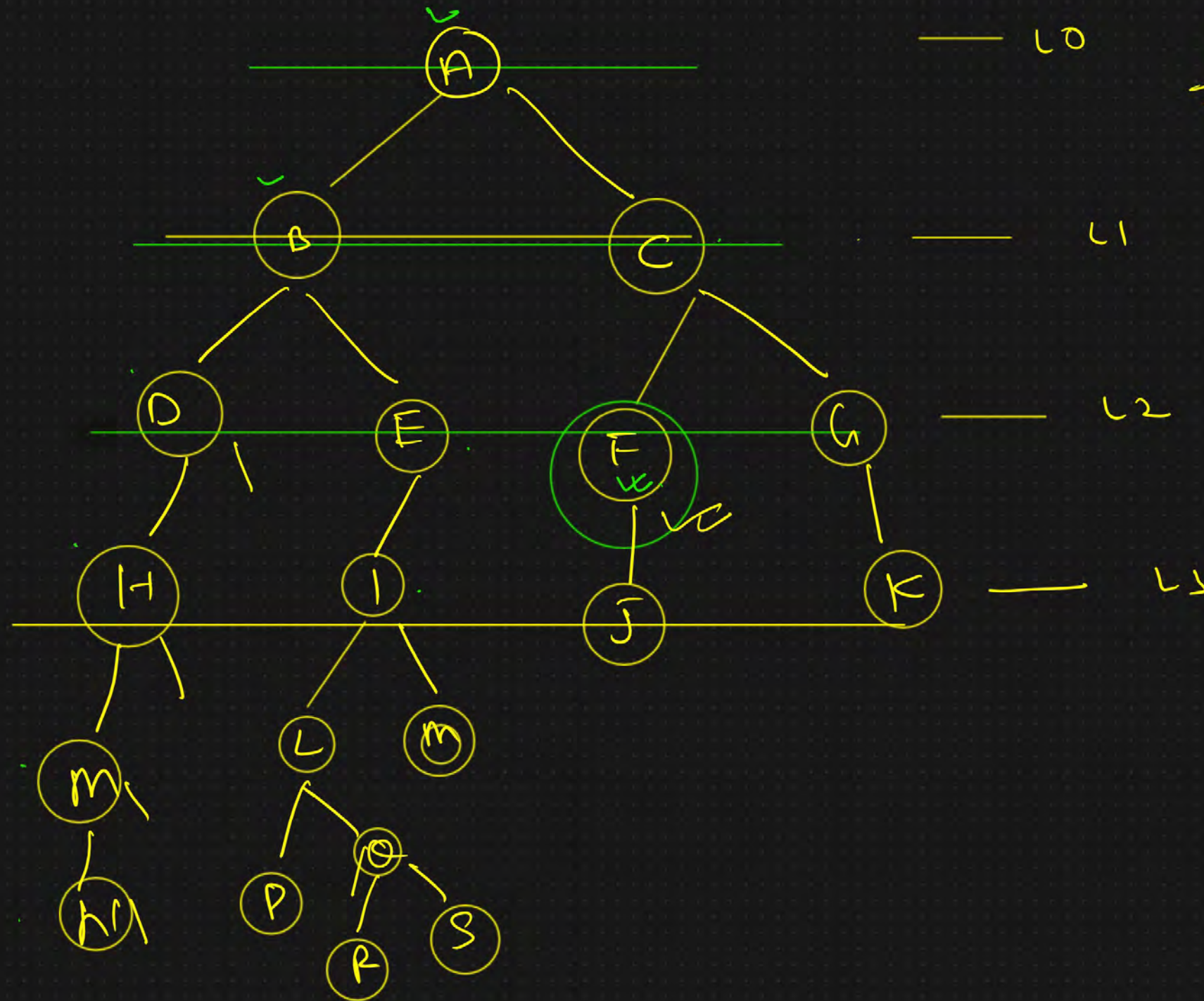
Topic

Topic

Topic



# Depth Limited Search Algorithm



~~D=2~~

Depth = 0

D = 1

D = 0

A

D = 1

A → B → C

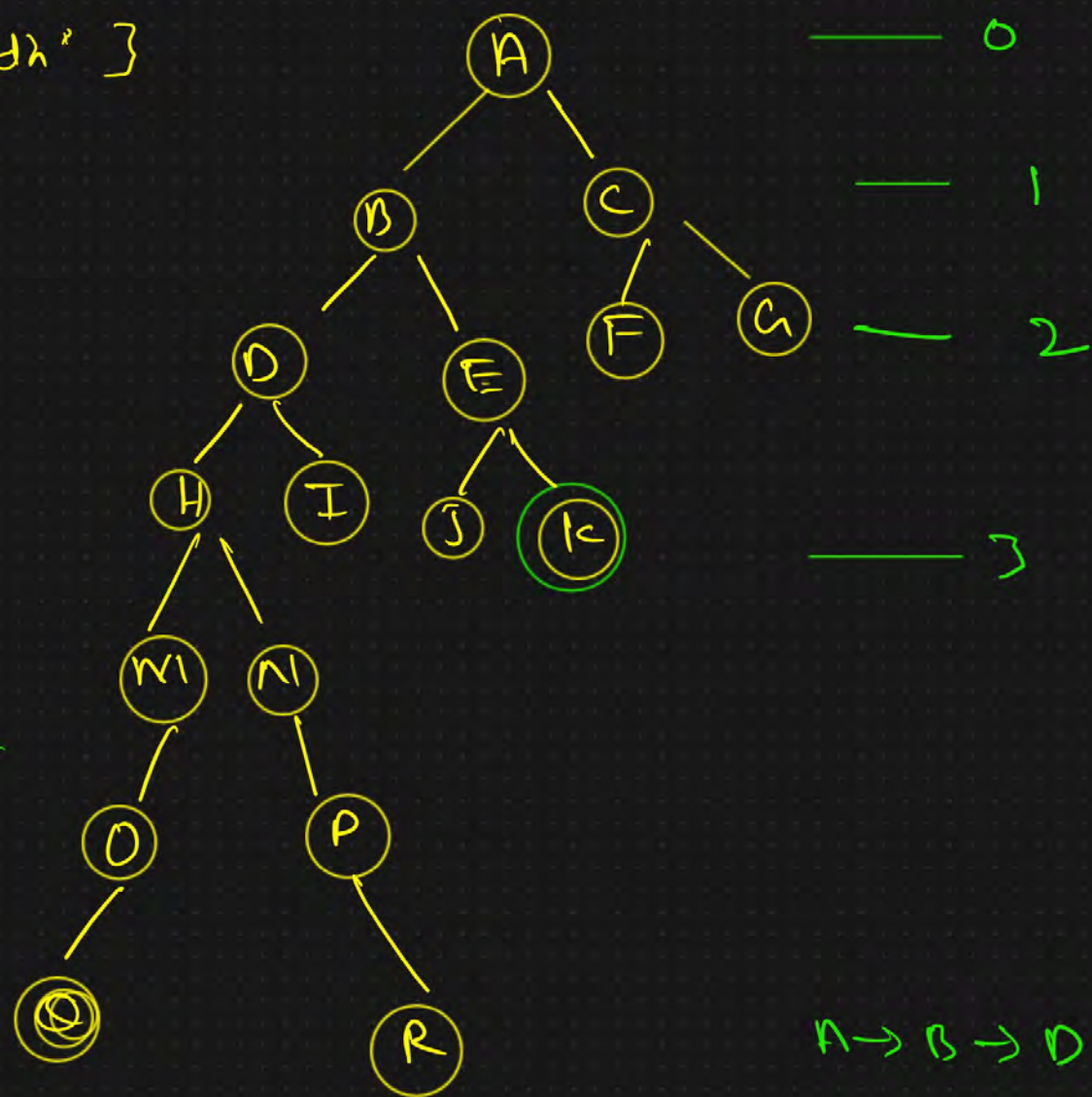
D = 2

A → B → D → E → C → F

Iterative Deepening Depth First Search Algorithm → (IDDFS)



$I = [1, 2, 3, 4, \text{'sydha'}]$



DFS  $\rightarrow$

DLS  $\rightarrow D=2$

Iter  $\rightarrow 0$

A

Iter  $\rightarrow 1$

$A \rightarrow B \rightarrow C$

Iter  $\rightarrow 2$

$A \rightarrow B \rightarrow D \rightarrow E \rightarrow C \rightarrow F \rightarrow G$

Iter  $\rightarrow 3$

$A \rightarrow B \rightarrow D \rightarrow H \rightarrow I \rightarrow E \rightarrow J \rightarrow K$

Time complexity BFS, DFS, IDDFS, DLS  $\rightarrow \underline{O(b^m)}$

$b$  = branching factor

$m$  = Depth of Graph / Tree

SC =  $O(m)$  = DFS

SC = IDDFS =  $O(b^m)$

SC = BFS =  $O(b^m)$   
Uniform

Cost Search algorithm



① It's a part of uninformed search.

② This algo is implemented using priority queue.

1000  
IDDFS  $\rightarrow A \rightarrow$

100  $\rightarrow 1 \rightarrow$   
 $A \rightarrow B \rightarrow C$

100  $\rightarrow 2 \rightarrow$

$A \rightarrow B \rightarrow D \rightarrow E \rightarrow C \rightarrow H \rightarrow I$

BFS

$A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow H \rightarrow I$

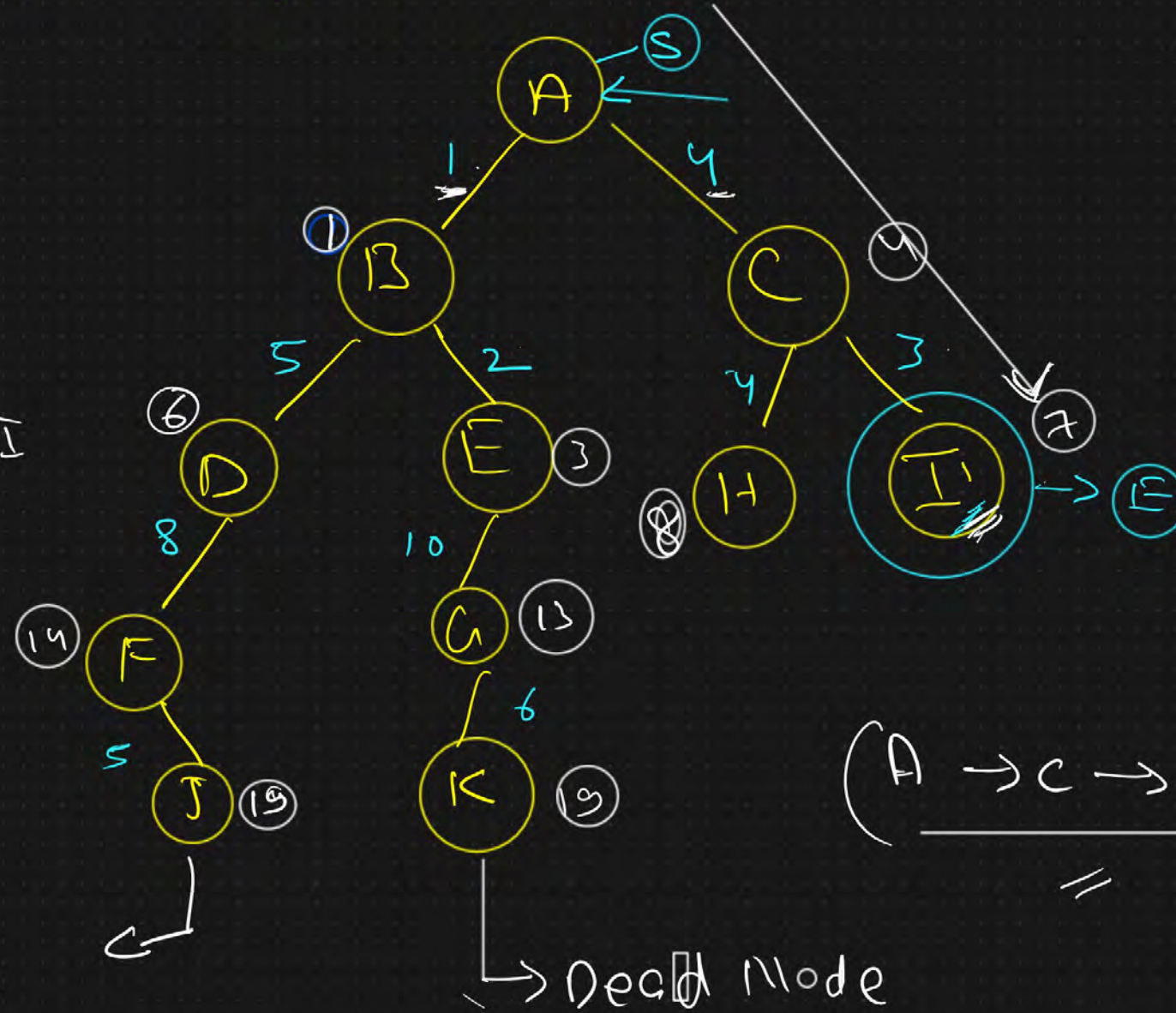
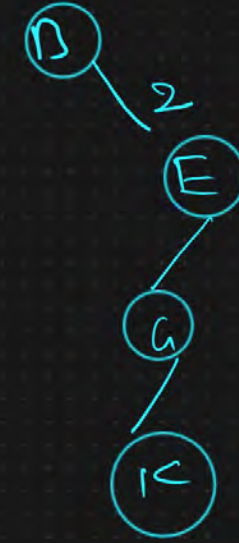
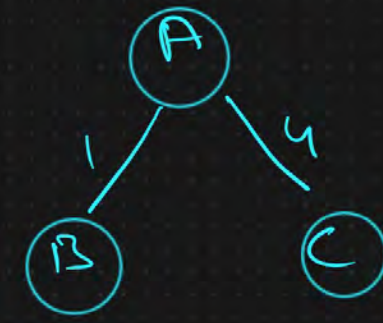
Dead

Dead Mode

DFS  $\rightarrow A \rightarrow D \rightarrow D \rightarrow F \rightarrow J \rightarrow E \rightarrow C \rightarrow K \rightarrow C \rightarrow H \rightarrow I$

DLB  $\rightarrow A \rightarrow D \rightarrow D \rightarrow E \rightarrow C \rightarrow H \rightarrow I$

AO\* Search Algorithm



$(A \rightarrow C \rightarrow I) = \text{Result}$



① AO\* is a part of informed Search. (heuristics)

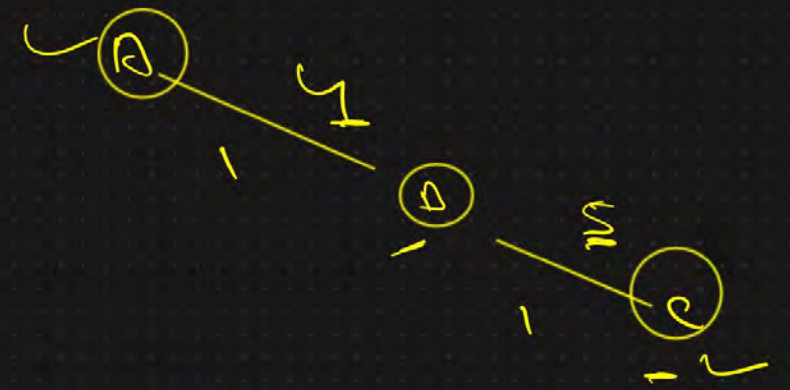
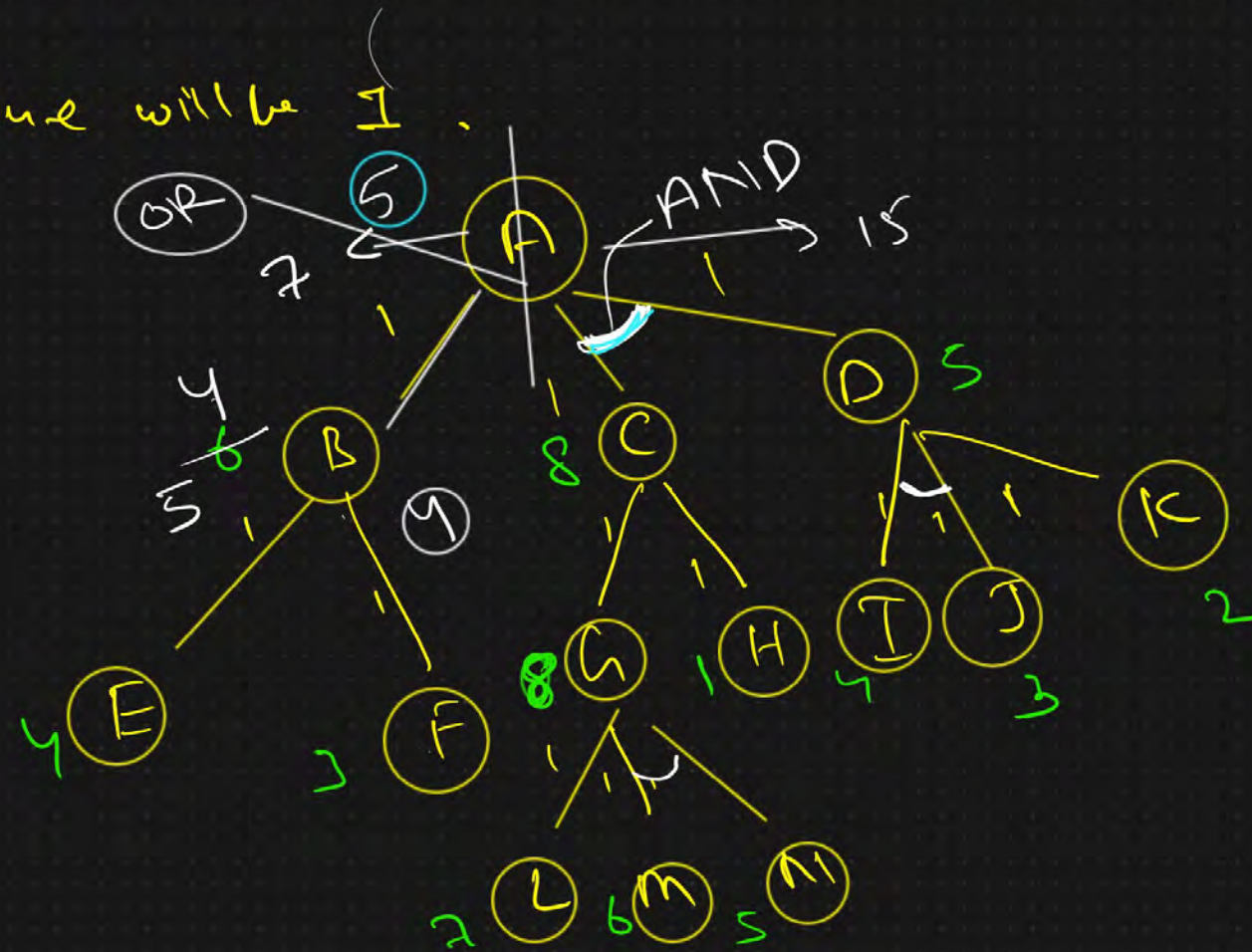
② AO\* (AND-OR)

③  $f(n) = g(n) + h(n)$

$g(n)$  = Total cost to travel from one Node to another

$h(n)$  = estimated cost of travel from one state to another.

④ All edges default value will be 1.



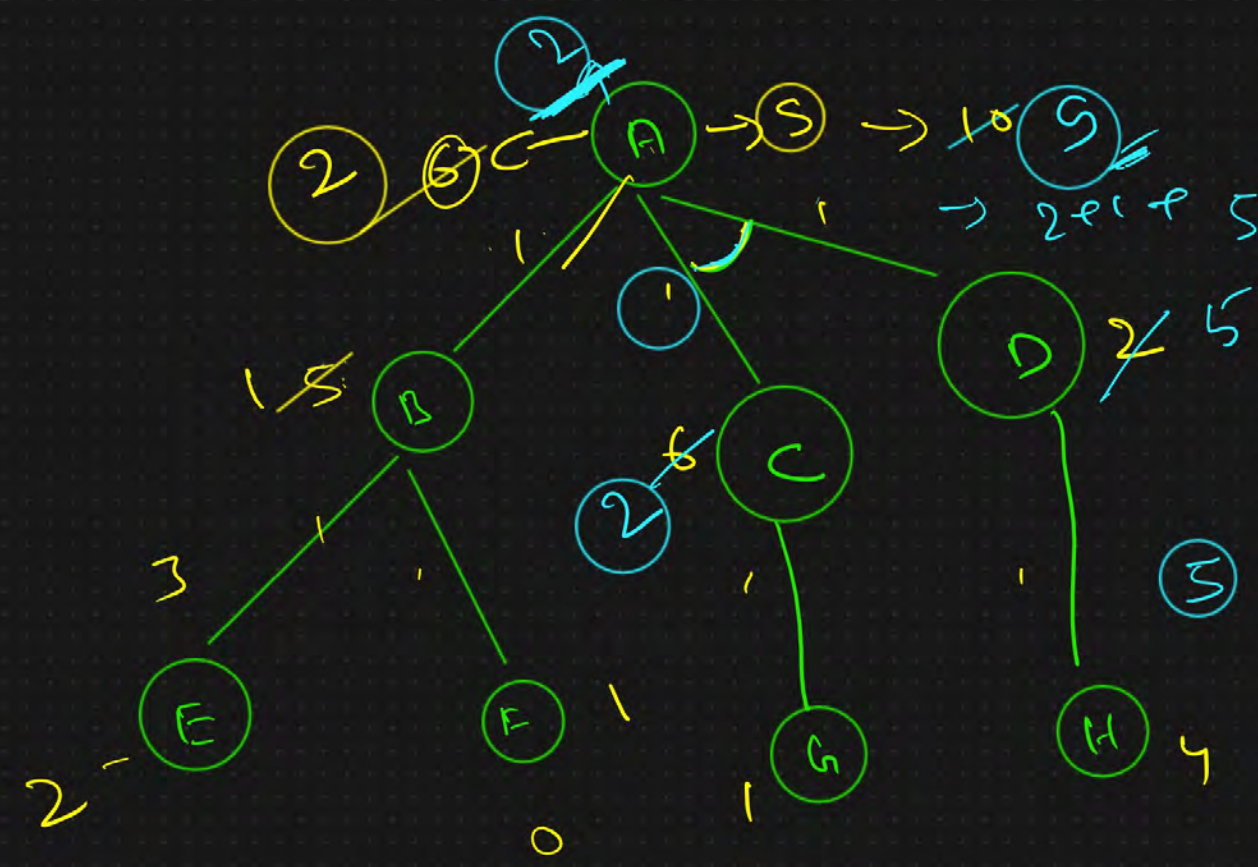
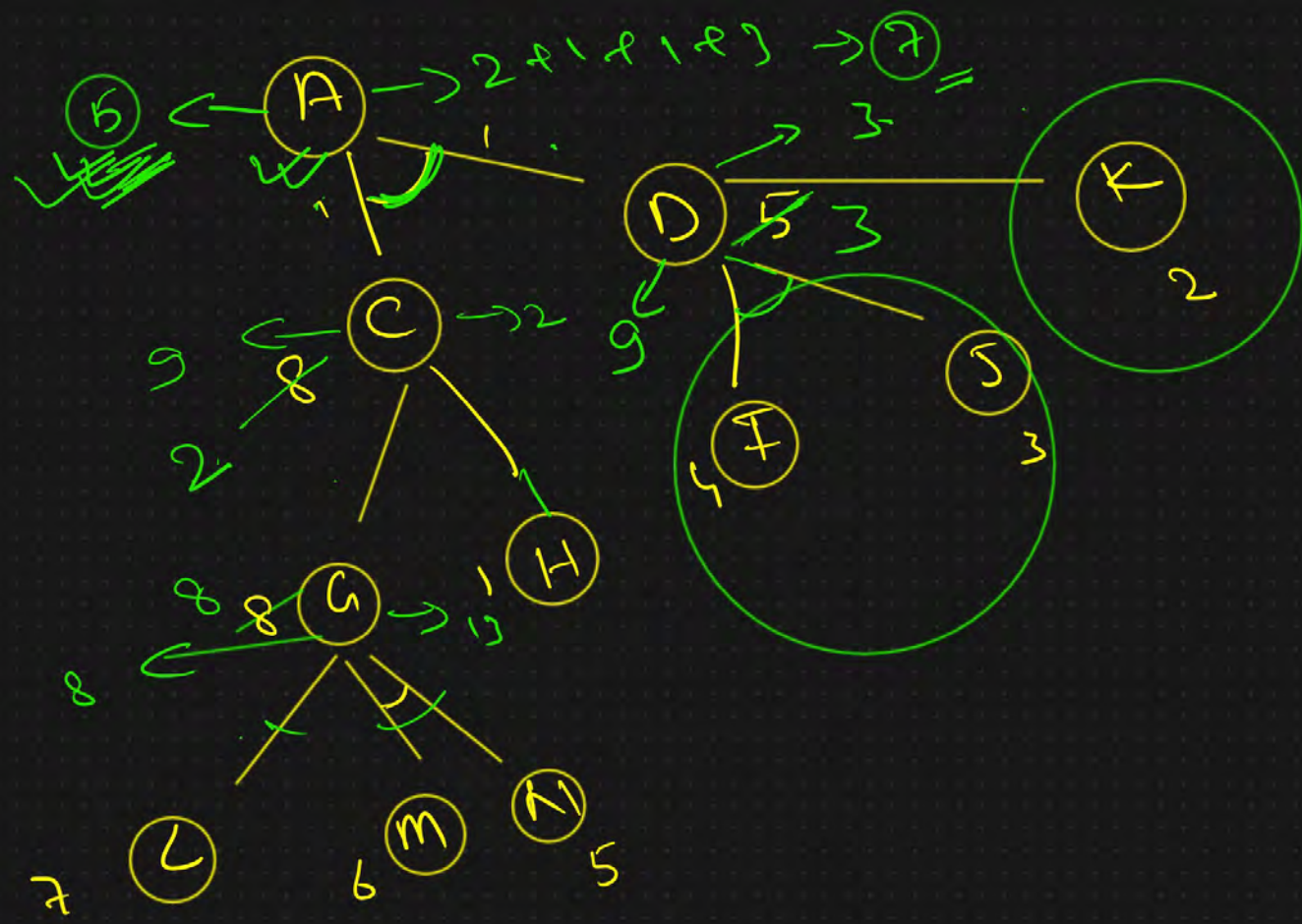
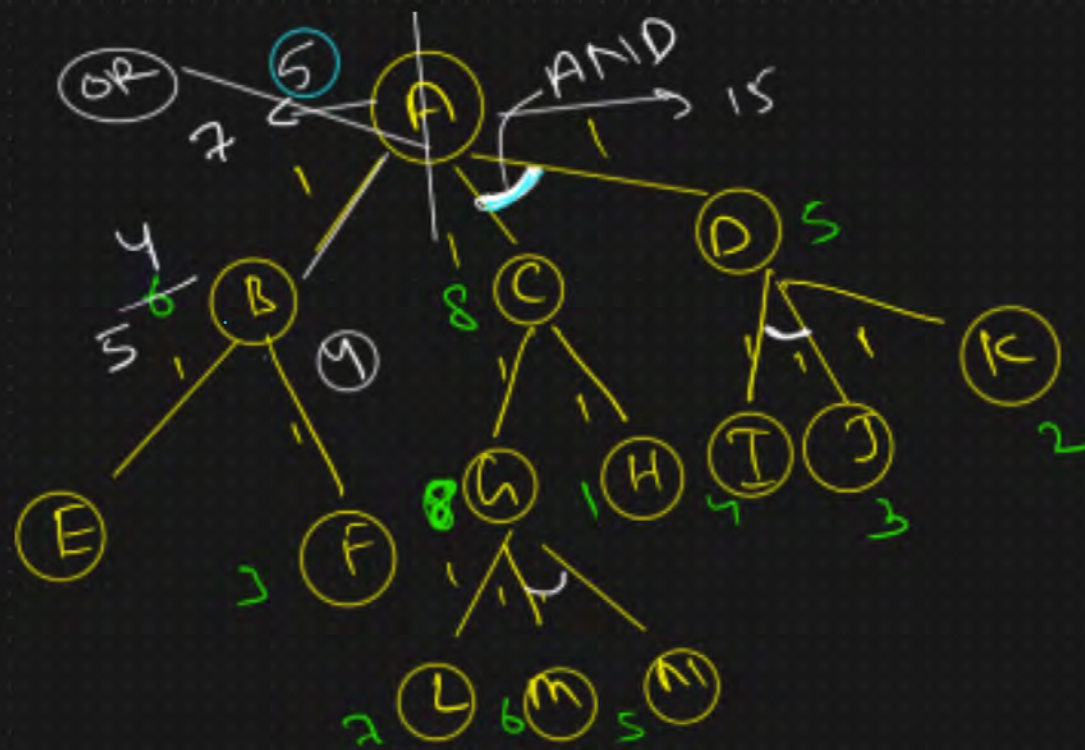
if day

if night

$f(B) = 1 + 6 = 7$

$f(D) = 2 + 13 = 15$





$$J(n) = S(n) + h(n)$$





## 2 mins Summary



Topic

Topic

Topic

Topic

Topic



# THANK - YOU