ASSIGNMENT

Course Code: CSE-214/ CSE-215

Course Name: Algorithm & Lab

Submitted To

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Algorithm

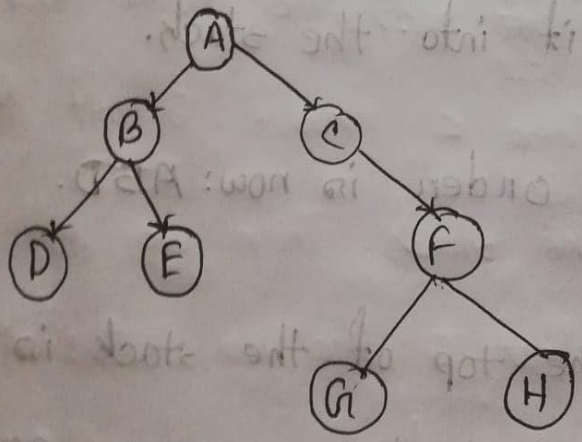
Assignment II

Topic no: 01

Full Tree Traversal

Tree is a special kind of acyclic graph that contains no circle.

Mainly we use dfs algorithm for full tree traversal.



At first here we will use time traversal to traversal.

Here, A is the root node.

After that, we push A in the stack. Then we will go in B. and push B in the stack.

*So, now the traversal order is: AB

Then, we will check the connected node of B. And go one of them those two are connected. Then we will go to D. And push it into the stacks.

*So, the traversal order is now: ABD.

Now, there, in the top of the stacks is D. And DFS will check were we can go by D. from this tree we can see that D is only connected with B. But we traversal D already. Thats why we pop stacks. And go back

to node B. Then DFS will check unvisited nodes. The only unvisited nodes ~~are~~ is E. Then we will go to the node E. Then push E in the stack.

*So, Now the Traversal order is ABDE.

Then, we will check the adjacent nodes of E. E have only one adjacent node and that is B. And Here B is already visited. So, E dont have any adjacent nodes in left side. pop stack and go back to E. There are no unvisited adjacent nodes of B. so, pop stack again. we came back into nodes A. Now, there is only one adjacent not of A and it is C that is unvisited. So, DFS will go into C. push C in stack.

*Now, the traversal is ABDEC

(4)

Now, we will check adjacent nodes of C. C have only one adjacent node and that is F. Now, we push F in the stacks.

* Now the traversal order is ABDECF

Then we will check adjacent nodes of F. F ~~one~~ has ~~one~~ two unvisited node that is G and H. Then F choose G 1st then push G into the stack. Then we will go G. After that G has no unvisited node so we pop stacks.

* The traversal order is now ABDECFG

After that we came back into F. F has another unvisited node and it is H.

Push H into stack. H has no unvisited node so pop the stack and came back to F.

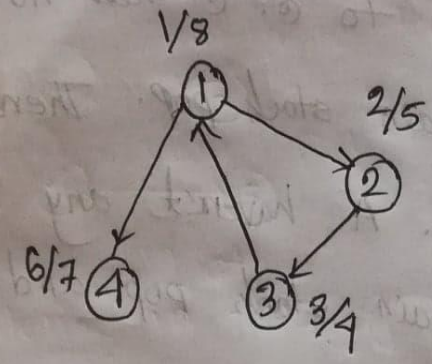
∴ Now the Traversal order is A B D E C F G H

Here, F doesn't have any unvisited node. so, stack pop. Then came to C. C has no unvisited node. so, again stack pop. Then we came back to A. A haven't any unvisited nodes. so, again stack pop and tree traversal has stopped.

Topic no: 02

Cycle finding

If there is a back edge in a graph than we can say that the graph has a circle.



1st we will start from 1 visited. in 1st node ①
Here 1 is a starting time. Then we will go to 2 no node and the starting time is 2. Then we will go to 3 no node and here the starting time is 3. Then we can

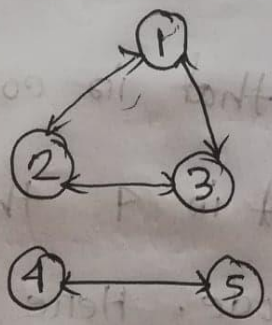
go 3 to 1 no node but 1 no node is already visited. So, we can't go to 1 no node. So, we will back in 3. So, now 3 no node ending time is 4. Then we will back into 2 no node Here the ending time is 5. Then we will go to 1 no node that is connected with another node and it is 4 then we will go to 4 no node. Here the starting time is 6. Then we see that we can't go anywhere from 4 no node. So, here the ending time is 7. Then we go back into node 1 and its ending time is 8.

Here node 3 and node 1 connected with the back edge, so the graph contains a circle.

Topic no: 03

Component Finding

Here, we will find out how many sub graph there are in a graph.



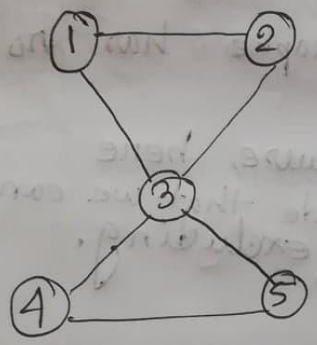
Here, at first in this graph we will check and run DFS. After 1 DFS if there find any unvisited nodes then we will run DFS from that node again. And count it.

From this tree graph we can find two componerts.

Topic - 4

Articulation point finding

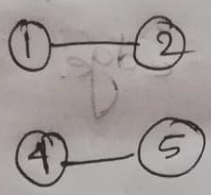
Here the main point is that. How a separate graph can be found excluding any node or any edge.



Here in this graph we see that 5 node is Here. And, 3 is node is connected with ① and ② no node and also 3 no node is connected with ④ and ⑤ no node. So, here if we excluding 3 then we find two graph.

So, It has an articulation point.

These two graphe that we find from the main graph are:



and

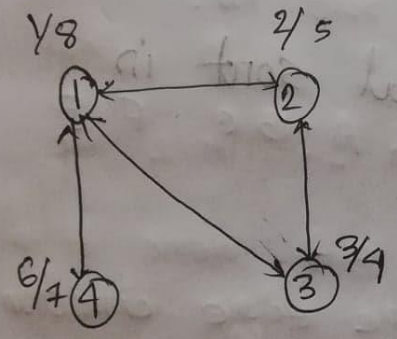
but in these two graphe has no articulation point. Because, here we can't find any node that we can excluding.

~~node~~

Topic - 05

Topological sort

The main theme is here that sort node ist by decending order of end time.



By cycle finding we can find here the sorting ~~point~~ time and the ending ~~poin~~ time.

Node:	1	2	3	4
Starting time:	1	2	3	6
ending time:	8	5	4	7

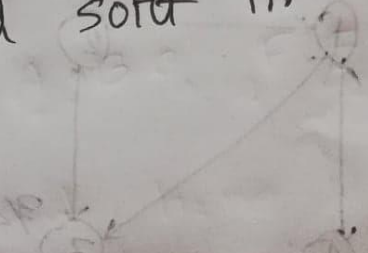
Now, Decending order of ending time is 8 7 5 4

Now the node is like that by following the decending order of ending point is:

1 4 2 3

Here the topological sort is

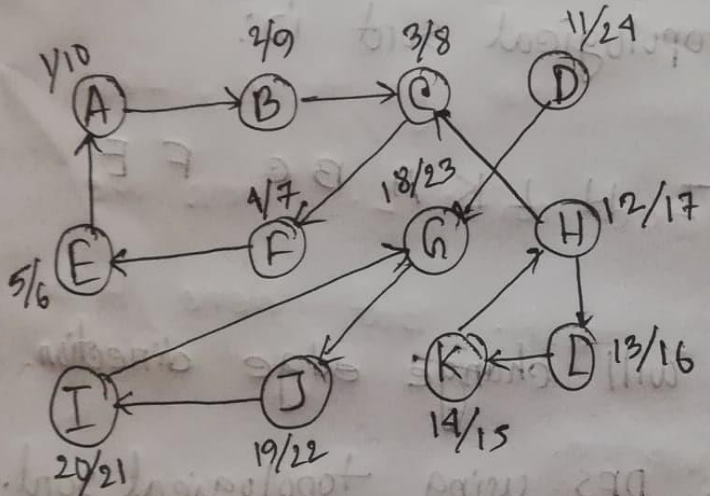
1 4 2 3



Topic- 06

strongly connected componend.

At first we will run DFS and make a topological sort.



Node:	A	B	C	D	E	F	G	H	I	J	K	L
starting time:	1	2	3	11	5	4	18	12	20	19	14	13
ending time:	10	9	8	24	6	7	23	17	21	22	15	16

Decending order of ending time is:

24 23 22 21 17 16 15 10 9 8 7 6

By decending order of ending time the node is now:

D G J I H L K A B C F E

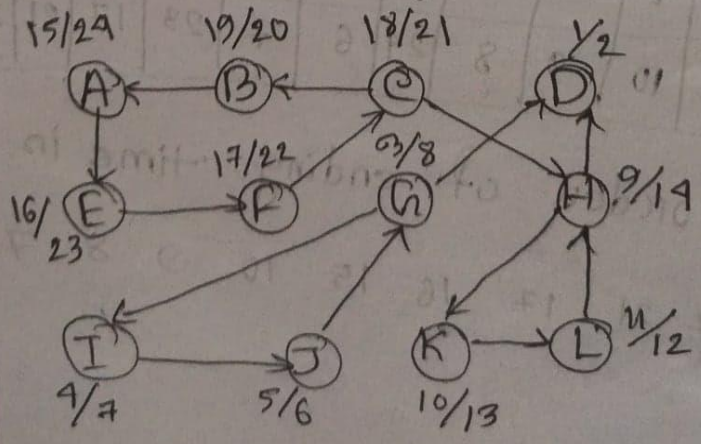
So, the topological sord is:

D G J I H L K A B C F E

Now, we will change edge direction.

Then run DFS using topological sord.

Here, D is a single component.



We know that the topological sort from graph 1 is

D G J I H L K A B C F E

~~cte~~ Now, we start it with D.

From this graph we can see that we can't go anywhere from D.

So, D is the 1st component, Here.

then the element in G that we find in topological sort.

From G we can go I, then ~~here I~~ ~~in conn~~ we can go J then can go to G but G is already visited. So, the 2nd component is,

G I, J

then we can find that next element is H, that is not visited. so, the next starting node is H.

From H we can go to K, that is connected with L. Then we can go L to H. But here H is already visited.

So, the 3rd component is

H K L

From the topological sort we can find that D G J I H L K is visited. So, then we will start from node A. Then is connected

with E. with direction A to E. Then the next connected direction is E to F, F to C, C to B and B to A.

But here A is already visited.

So, now the 4th component is

A E F C B

So, Now, the strongly connected component are

D

J I G

L K H

B C F E A