

FINDING ARTICULATION POINTS



ALGORITHM

Step 1. Do a dfs of the graph, say starting from node 1.

Step 2. Give a depth first numbering(dfn) to the nodes of the graph.

Step 3. The L or LOW or Least value of a node is the least numbered(dfn) node that can be obtained by a back edge from the node to one of its ancestors, or the least node that can be obtained by a back edge from any one of its descendants.

Step 4. If the dfn of a node is less than or equal to the L value of one of its children then the node is a articulation point.

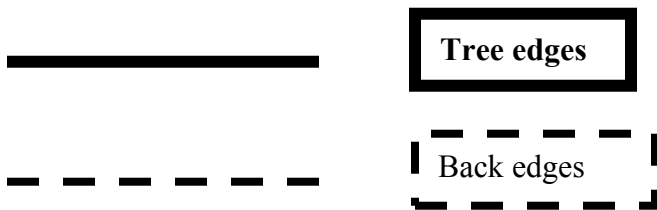
TO COMPUTE THE L VALUES
TRAVERSE THE DEPTH FIRST

SPANNING TREE IN POSTORDER AND
APPLY THE FORMULA:

L of a node = $\min\{\text{dfn of the node}, \min\{L \text{ of the children of the node}\}, \text{dfn of a node that is obtained by a back edge from the node or its children}\}$

NOTE:- FOR A SMALL GRAPH THE L VALUES CAN BE OBTAINED BY INSPECTION

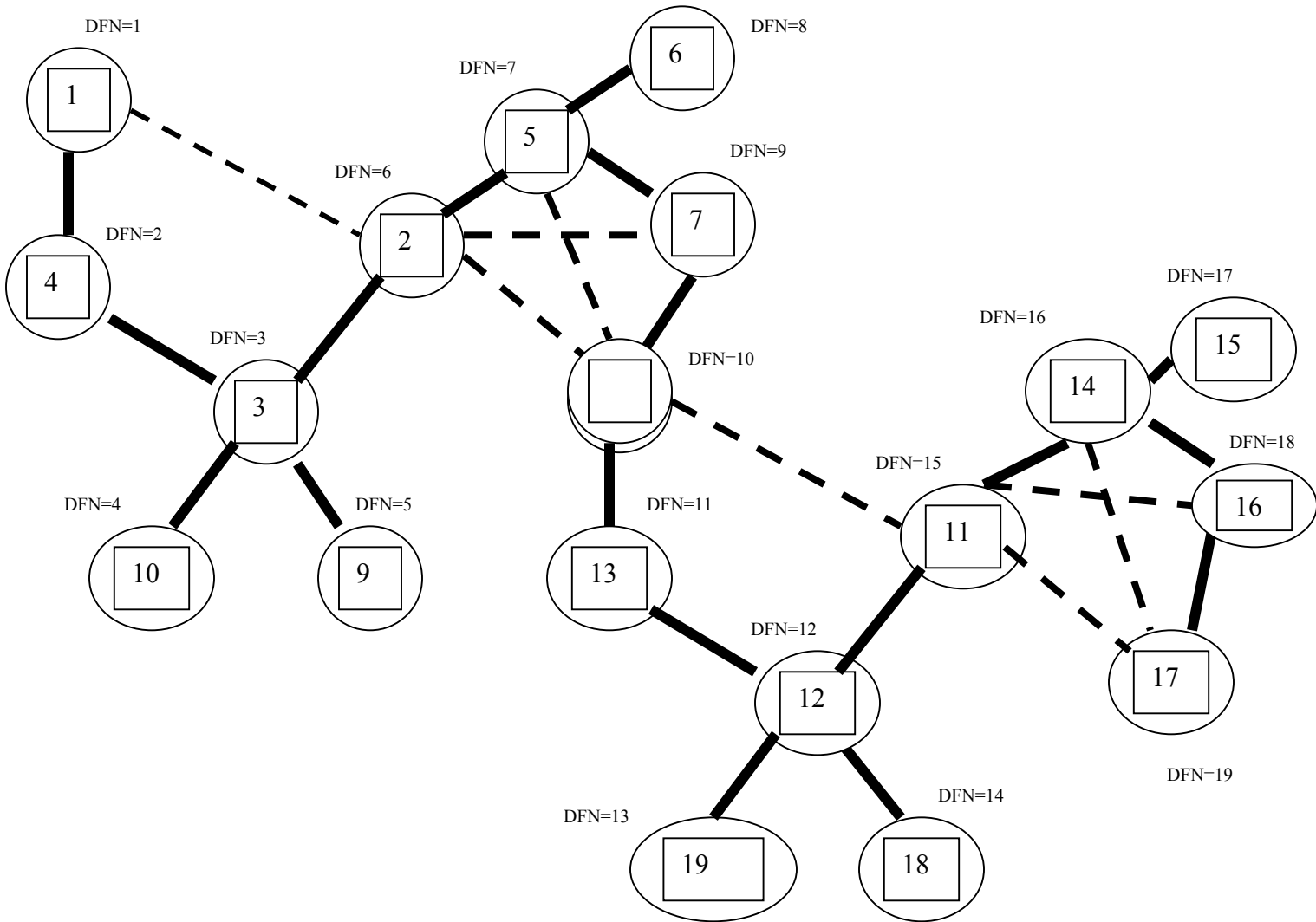
In the graph below, in the dfs spanning tree:



N means not an articulation point

Y means it is an articulation point

SAMPLE GRAPH



Node N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
$L_{node} = \text{low, least value}$	1	1	1	1	6	8	6	6	5	4	10	10	10	10	17	15	15	14	13
DFN_{node}	1	6	3	2	7	8	9	10	5	4	15	12	11	16	17	18	19	14	13
$DFN_{node} \leq L_{child}$	N	Y	Y	N	Y	N	N	Y	N	N	Y	Y	N	Y	N	N	N	N	N