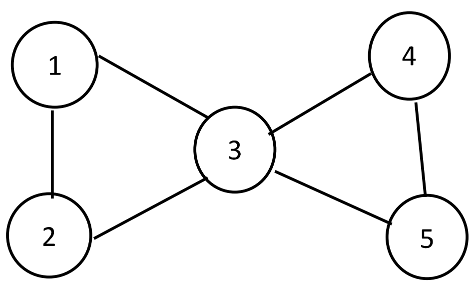
BICONNECTED COMPONENTS

A **biconnected component** of a graph is a connected subgraph that cannot be broken into disconnected pieces by deleting any single node . That is , a Graph G is biconnected if and only if it contains no articulation point.

An **articulation point** is a node of a graph whose removal would cause an increase in the number of connected **components**.in other words, A vertex in a graph G(connected graph) is an articulation point if and only if we delete the vertex v and all its edges then it disconnect the graph into 2 or more non empty components

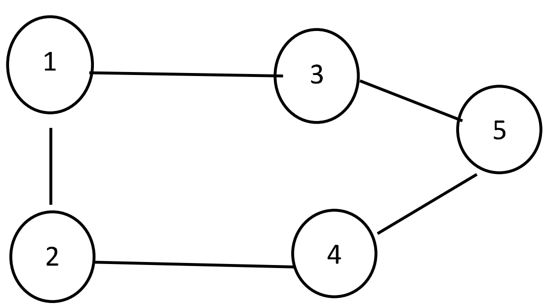


We can delete any vertex and its associates edges that result in two or more connected subgraph , the given example :

-If we delete the vertex 1 then it result in a single connected graph

.-If we delete vertex 3 then it result in 2 subgraph then,vertex 3 is an Articulation point,So this graph is not biconnected.

Eg: for biconnected graph



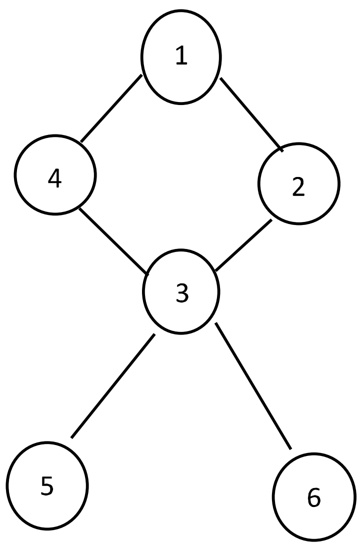
Q;Find the articulation point in a graph

Step 1: Construct depth first traversal and provide number for each node according to the

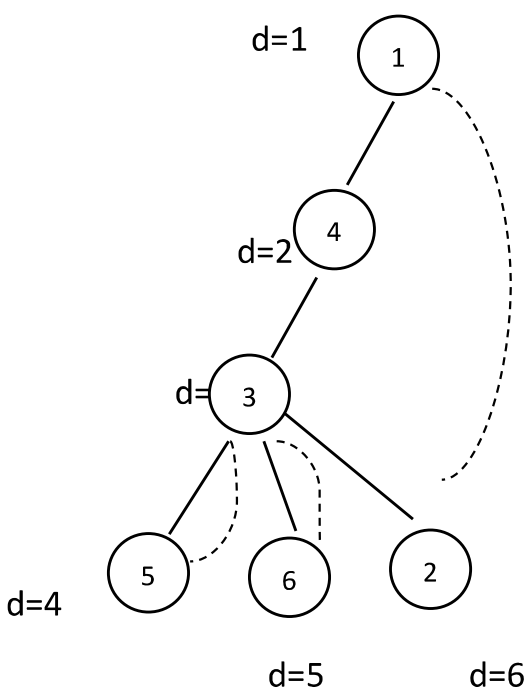
Traversal.Find the lowercase number of parent for each node.

Step 2:If a root node has atleast 2 children then it will be articulation point.Also,leafnode has no Articulation point.

Eg:



Dfs for the above graph



vertices	1	2	3	4	5	6
Discovery time(d)	1	6	3	2	4	5
Lowest discovery number(L)	1	1	1	1	3	3

Here leaf node has no articulation point so , leaf node is biconnected.

To find the articulation point consider 2 edges u,v.here,u is the parent and v is the child

then u,v become an articulation point if and only if

L[v]>=d[u]

If this satisfies then u is an articulation point.

Consider the next vertex v=4 and u=3

- L [4]>=d[3]

  1>=3

  Here the condition is note satisfied.

Consider the next 2 vertex v=5 and u=3

- L[5]>=d[3]

  3>=3

Here the condition is satisfied .therefore, u is an articulation point.so,3 is an articulation point.