## Biconnected Component

A maximal biconnected subgraph is a Biconnected Graph.

Example.

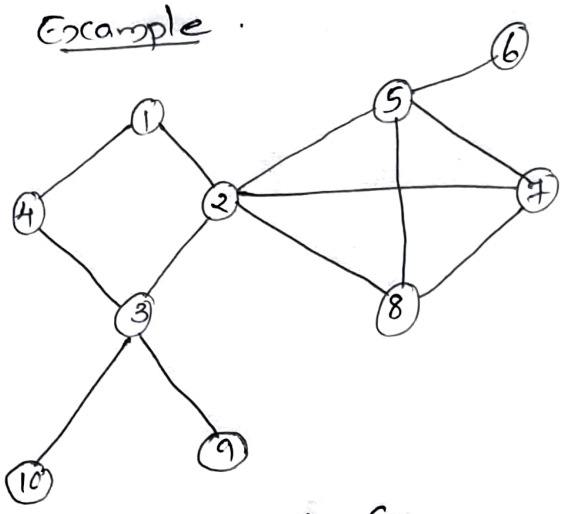



Fig: Graph G1.

* Between two biconnected components one vertex will be common & it is called it as articulation point.

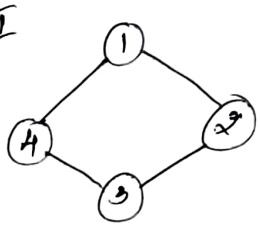
* In a biconnected graph there should not be a articulation point.

* Articulation point means when a vertex and edges from that vertex is removed and then the Graph devides into two disconnected components then that vertex is called as articulation point.

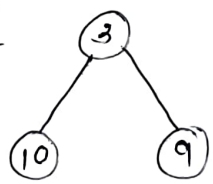
Eg: 3, 2, 5

Biconnected components of above Graph G1.

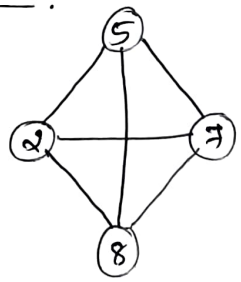
I



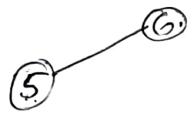

II




III



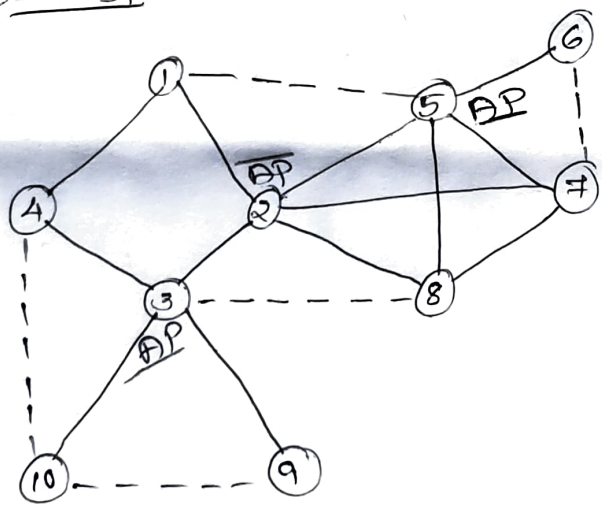

IV



Construction of Biconnected Graph.

1. check whether the Graph is Biconnected or not.
2. If not then identify all the articulation points (AP)
3. If AP exist then determine a set of edges whose inclusion makes the graph connected.
4. Then transform the graph in to biconnected graph by including the necessary edges.

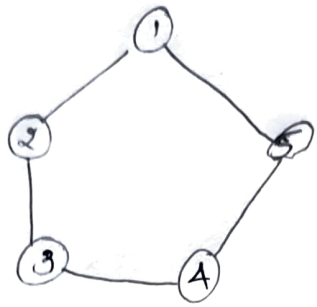
Example




—— existing Edges.

---- Included edge

# Minimum cost spanning Tree




$G(V, E)$

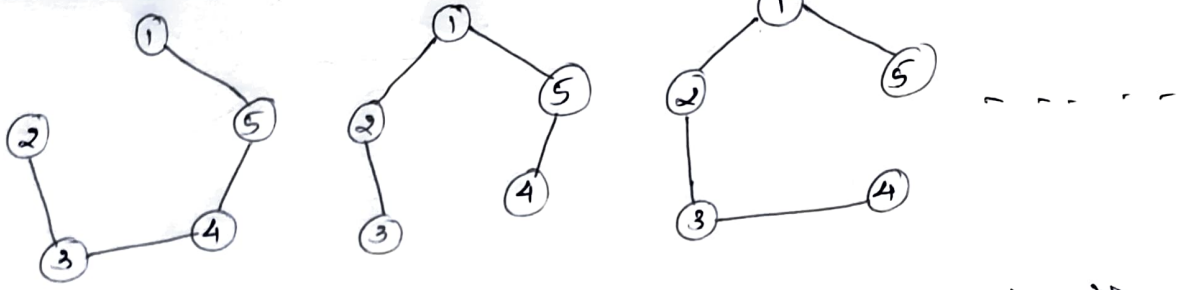
spanning tree of this graph is $G'(V', E')$

where

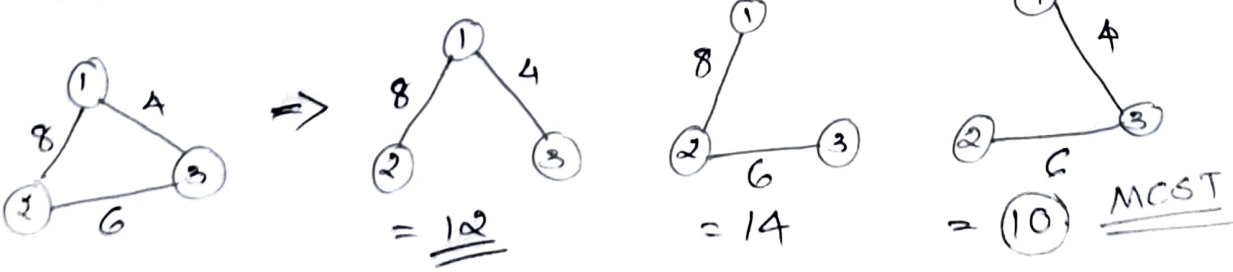
* $V' = V$
* $E'$ is subset of $E$ $E' \subset E$
* $E' = |V| - 1$
* No cycles are allowed.
* No disconnected components are allowed.

* A graph can have no of ST.

Example of ST of above graph

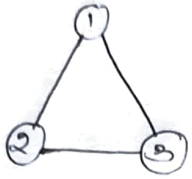



Minimum cost spanning Tree means, in the case of a graph with weights or cost for all edges then the total cost of the spanning tree must be minimum.



* A complete undirected graph can have

$n^{n-2}$ no of ST




$3^{3-2} = 3^{1} = 3.$

* Every connected & undirected graph has atleast one ST.

* Disconnected graph does not have any ST.

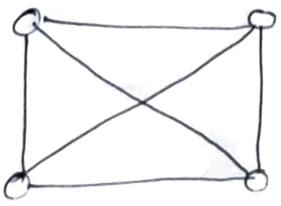
* ~~Prove~~ From a complete graph by removing $(e-n+1)$ edges we can construct a ST.

In above graph $e=3, n=3$, so $(e-n+1) = 3-3+1$

$= 1$

So. removal of one edge will make a ST.

Example



$e = 6$

$n = 4.$

Total ST $= n^{n-2} = 4^{4-2} = 4^{2} = 16$

$e-n+1 = 6-4+1 = 2+1 = 3$