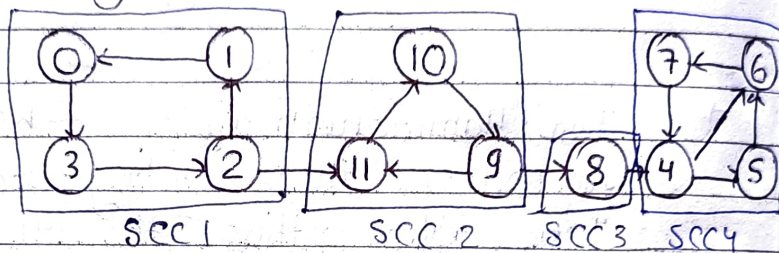


Day - 221

Graph - 25

*

Strongly connected Component:

⇒

In a directed graph, SCC is a subset of vertices where every vertex in the subset is reachable from every other vertex in the same subset by traversing the directed edges.

①

Count: 4

②

Print: 0 1 2 3

9 10 11

8

4 5 6 7

⇒

By normal traversing, we can't find the SCCs.

⇒

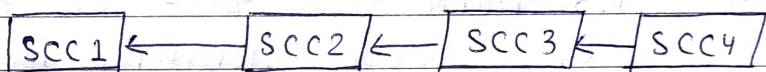
So, we can solve this question by using Kosaraju's algo.

=> we can visualize every component as a node then -



=> So, if we find a way that if we go in SCC1 then after traversing all the nodes of SCC1, we will not go to SCC2.

=> For that, we can reverse the edge b/w SCC1 & SCC2.



=> So, how to find these edges.

=> For that, if can reverse all the edges of the graph.

=> And after this operation, SCCs remain SCCs.

=> Also, we have to follow the order of traversing, i.e. SCC1 then SCC2 then SCC3 & then SCC4.

=> For this, we can use Topological Sort. by DFS method.

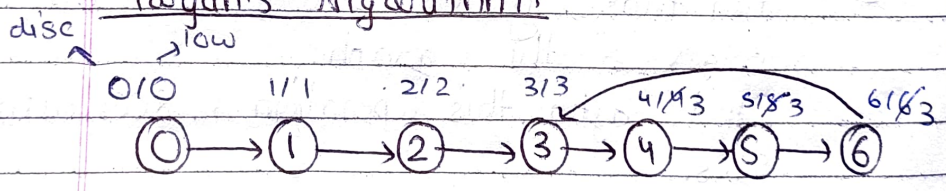
=> After that, we have to reverse the edges & Apply DFS.

Steps:

1. Topological Sort.
2. Reverse the edge.
3. Pop element from the stack
 ↳ If it is not visited
 → SCC++
 → DFS.

=> T.S, make sure that all the non-cycle nodes remains in order as traversed according to order.

* Tarjan's Algorithm:



=> So, we will use Tarjan's Algo. to find out SCC.

=> But it will find SCC in single pass but our kosaraju's Algo find SCC in 3 passes.

the

⇒ Now, we start traversing the nodes & give them disc & low time value.

⇒ And when we are returning back then we update the values of disc & low.

⇒ So,

↳ if (disc[node] < low[neigh])
 SCC X

↳ else
 SCC ✓

⇒ And then we update the low values of the node with min of low values of node & neighbour.

⇒ So, if disc & low value are equal then it is a SCC.

6/8/3
⑥ ⇒ If the neigh is already visited then we will update the low value with the min of low of node & neigh.

⇒ we also remember that if we will not directly apply above rule.

⇒ we first check that visited node in the stack is present or not.

⇒ If present, then we will apply the above rule.