



SNS College of Engineering Coimbatore - 641107



Maximum flow problem

AP/IT

- **Maximum Flow:**

It is defined as the maximum amount of flow that the network would allow to flow from source to sink.

- Multiple algorithms exist in solving the maximum flow problem.
- Two major algorithms to solve these kind of problems are
 - ✓ Ford-Fulkerson algorithm
 - ✓ Dinic's Algorithm.

Maximum Flow Problem

- *Given: Directed graph $G=(V, E)$,*

Supply (source) node O , demand (sink) node T

Capacity function $u: E \rightarrow \mathbb{R}$.

- *Goal: Given the arc capacities,*

send as much flow as possible from supply node O to demand node T through the network

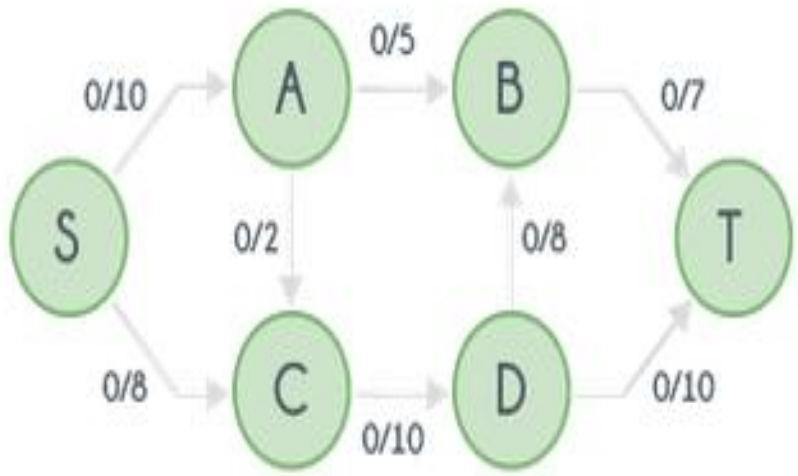
- **Ford-Fulkerson Algorithm:**

It was developed by L. R. Ford, Jr. and D. R. Fulkerson in 1956.

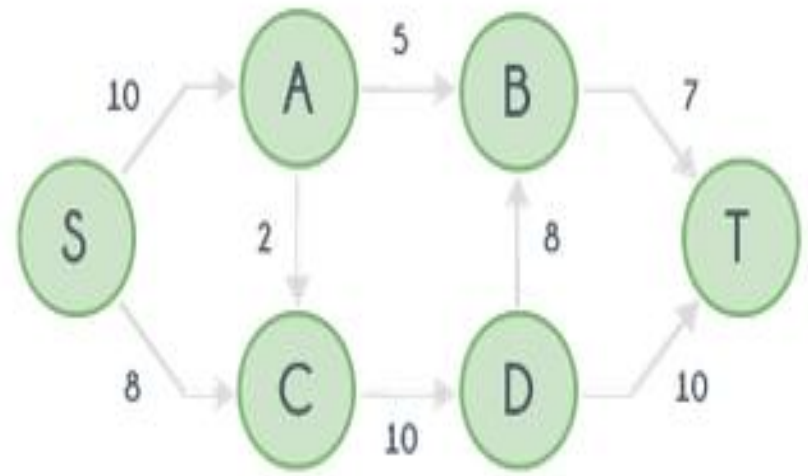
- Inputs required are network graph G , source node S and sink node T .

Algorithm

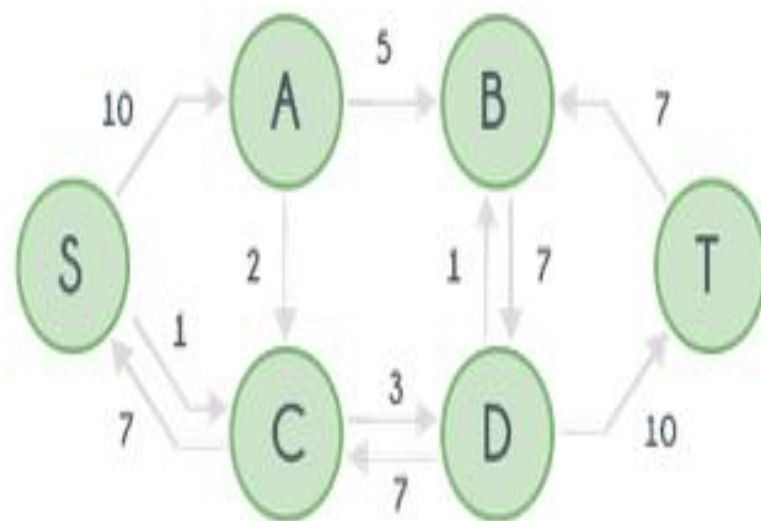
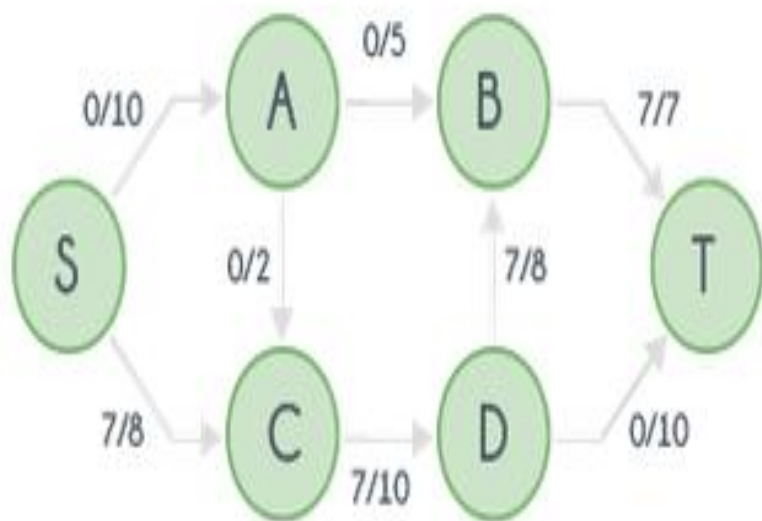
- FordFulkerson(Graph G, Node S, Node T):
Initialize flow in all edges to 0
while (there exists an augmenting path(P)
between S and T in residual network graph):
Augment flow between S to T along the path P
Update residual network graph
return



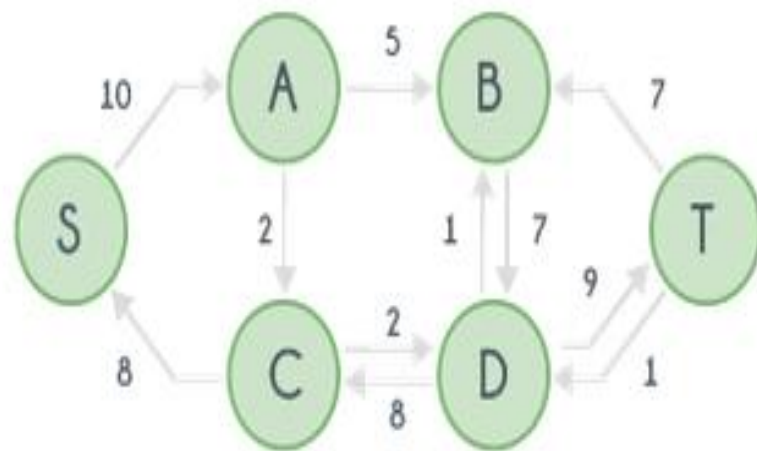
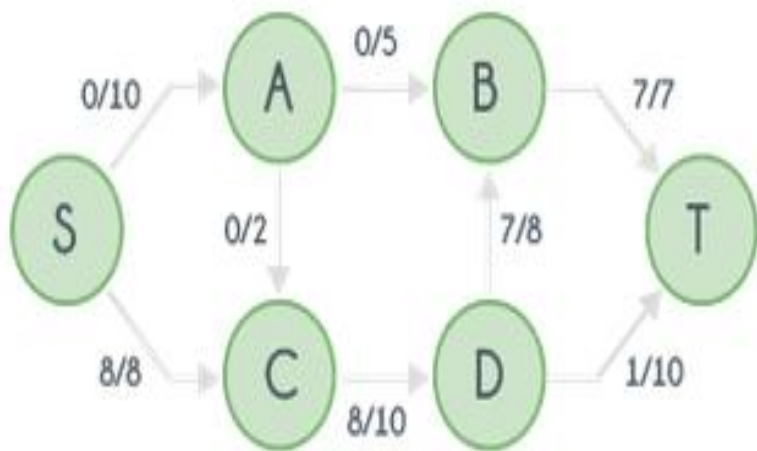
Flow = 0



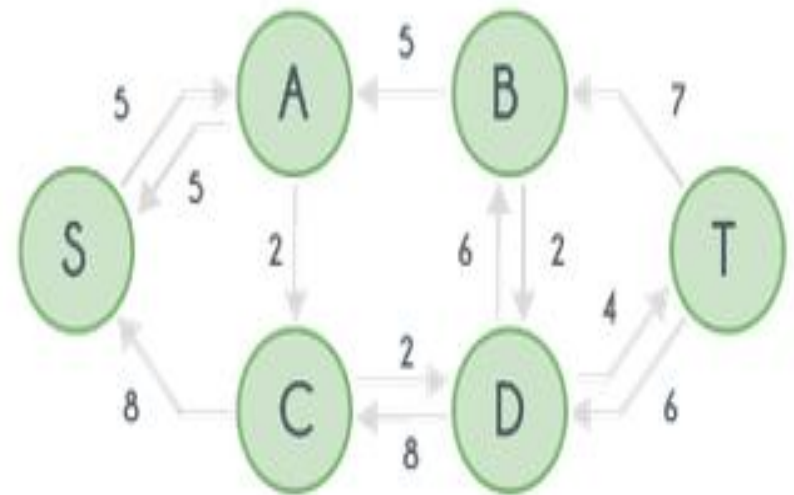
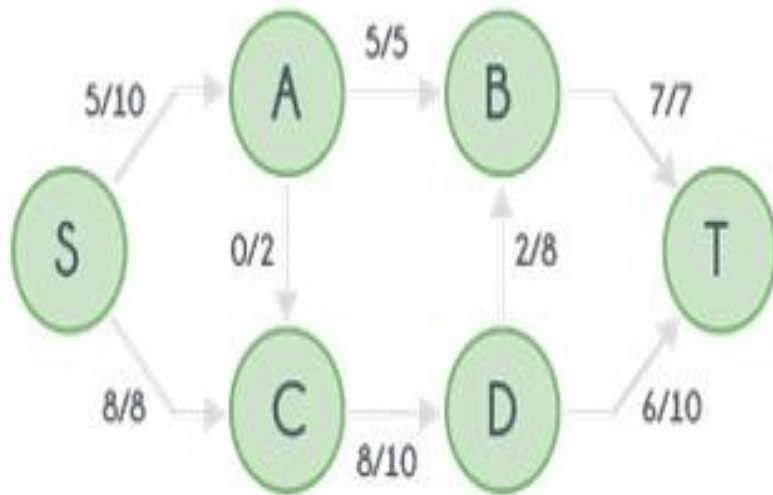
Path 1: S - C - D - B - T → Flow = Flow + 7



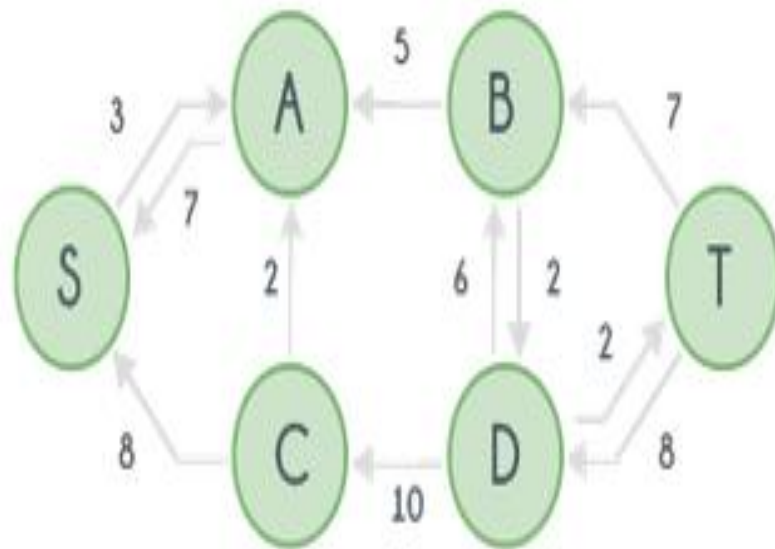
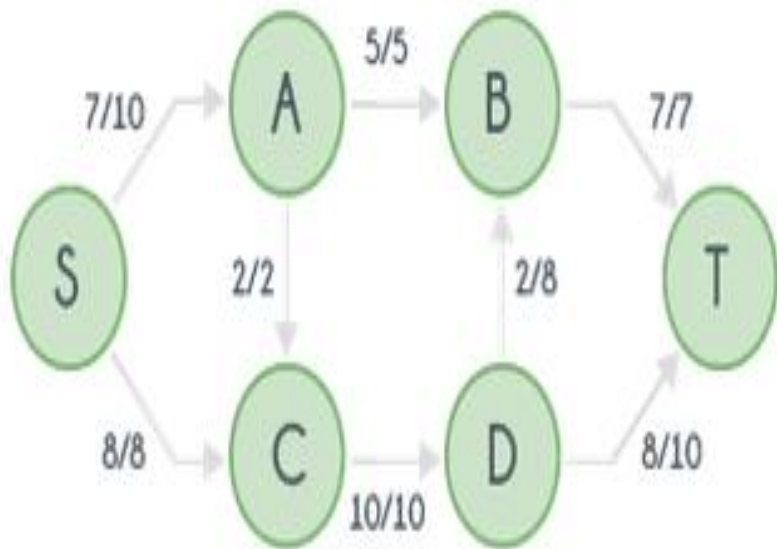
Path 2: S - C - D - T → Flow = Flow + 1



Path 3: S - A - B - T → Flow = Flow + 5



Path 4: S - A - C - D - T \rightarrow Flow = Flow + 2



No More Paths Left

Max Flow = 15