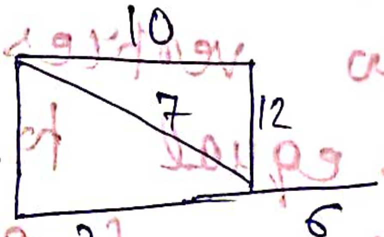
Connectivity:

Weight

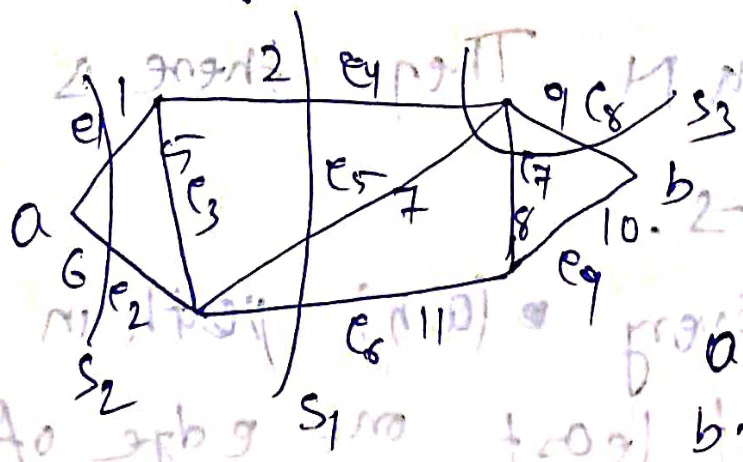
With each edge 'e' of a graph $G(n,m)$, let there be associated a real number $w(e)$ called it's weight, then G together with these weights is called a weighted graph.

$\sum_{i=1}^{m} w(e_i) = 40$, G :



Network

A network N is a weighted connected graph in which the vertices are called stations and the edges are flow lines, through which the given cummuditity such as oil, gas, water etc. flow.



a → Source

b → distination

A cutset with respect to the vertices a & b in a network N separates a & b.

Here S_1 & S_2 are cutset w.r.t a & b.

S_3 is not a cutset w.r.t a & b.

Capacity

The capacity of a cutsets in a network N is defined as the sum of the weight of each edges.

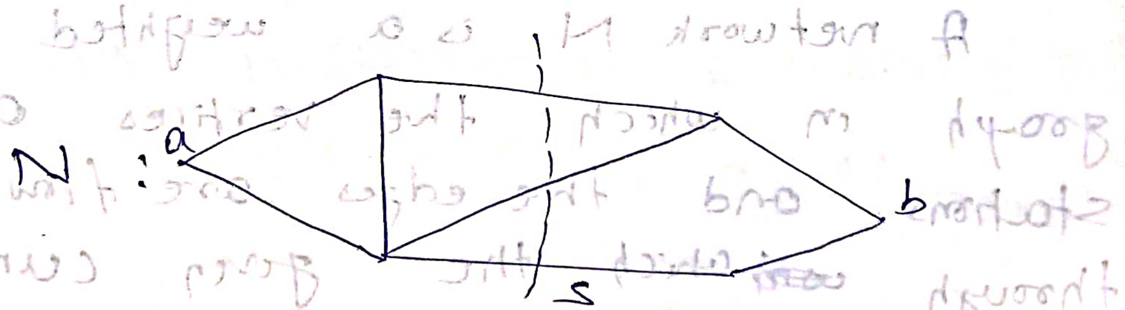
capacity $(S_1) = 20$

" $(S_2) = 7$

Theorem (maxflow and min cut thm)

The maximum flow possible between two vertices a & b in a network N is equal to the minimum of the capacities of all cutsets w.r.t a & b.

Proof



Let S be a cutset w.r.t a & b in network N. Then there is no (a, b) path in ~~N~~ $N - S$.

$\therefore$ Every (a, b) path in N must contain at least one edge of S.

Thus every flow from a to b (or from b to a) must pass through one or more edges of S. Hence the total ~~flowret~~ flowset from a to b of vertices can't exceed the capacity of S. Since this holds for all cut sets with respect to a & b it follows that the total flowset can't exceed the minimum of ~~they~~ there capacities.

Hence the theorem is proved.

(proved)