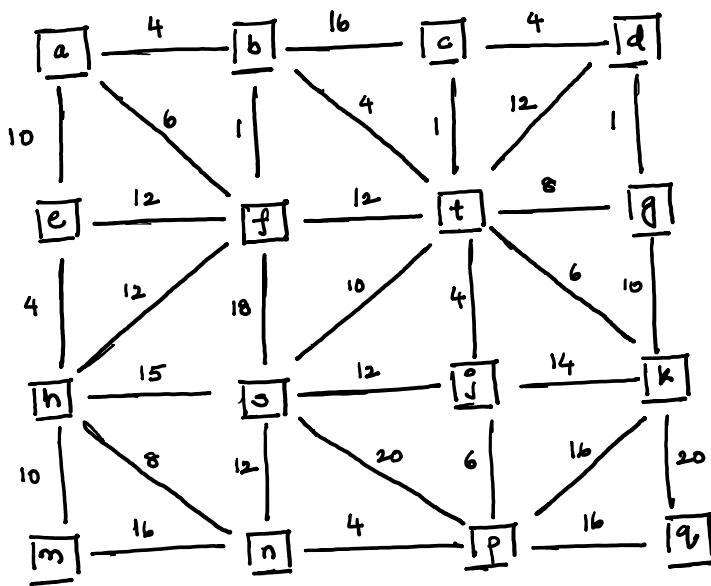


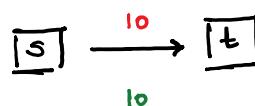
→ Finding CUT-TREE for the graph below



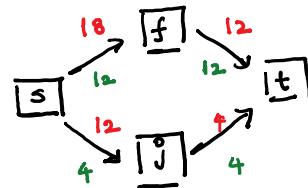
Let  $s = s$ ,  $t = t$

be our first terminals to find max flow

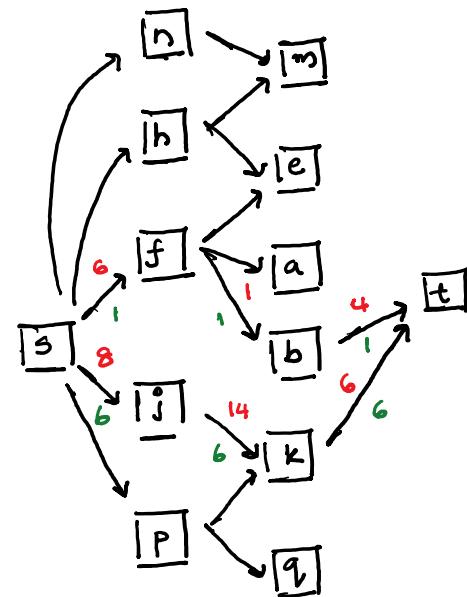
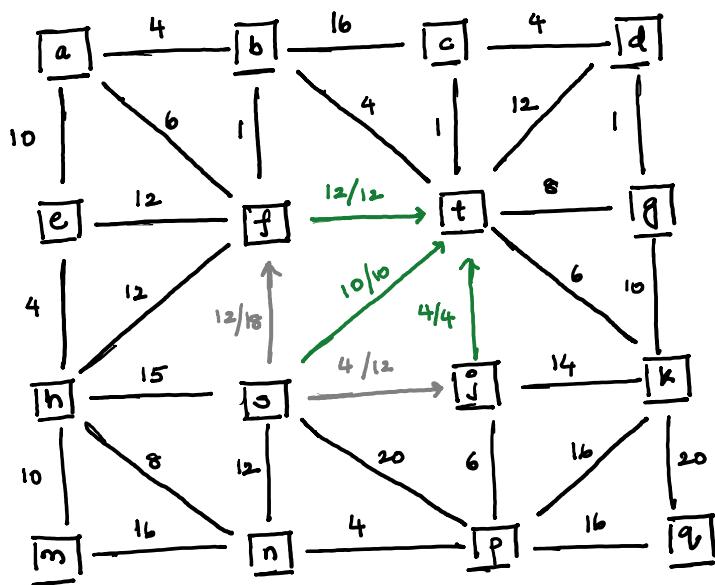
①

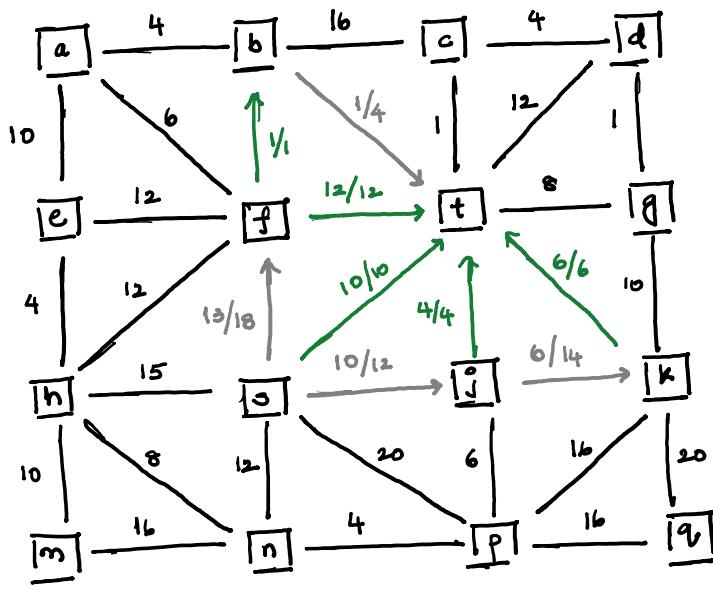


②

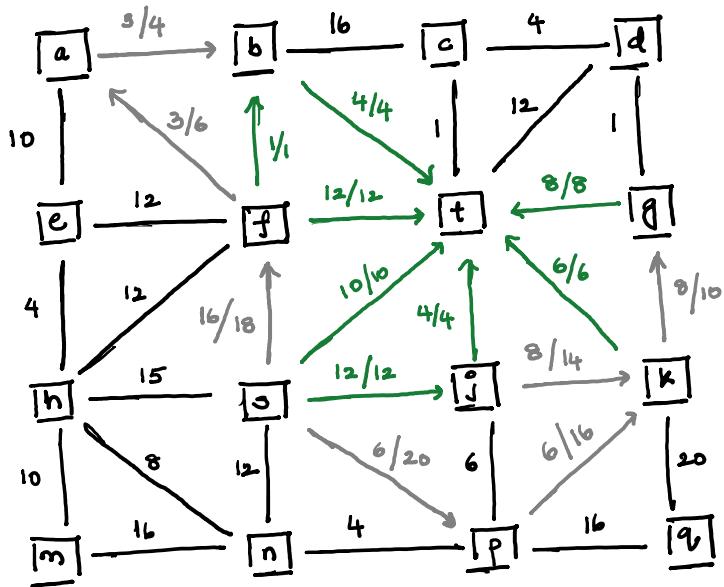
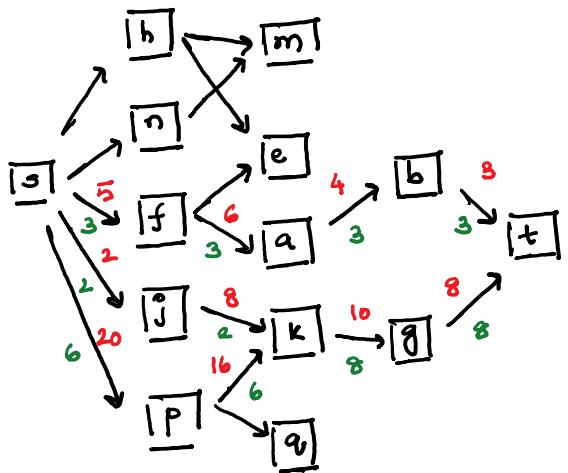


③

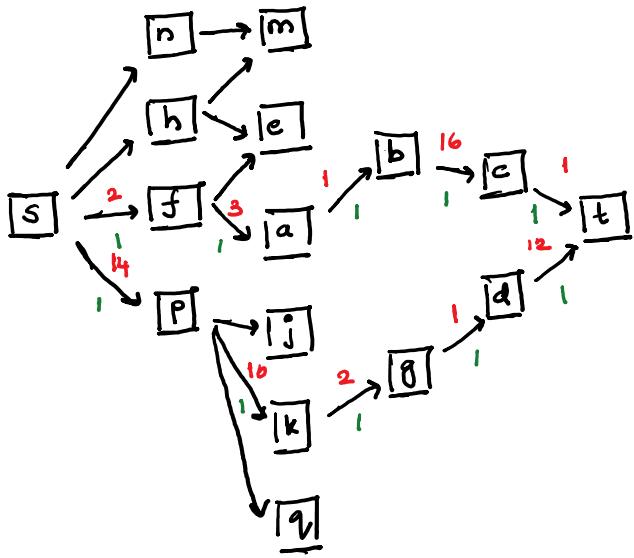


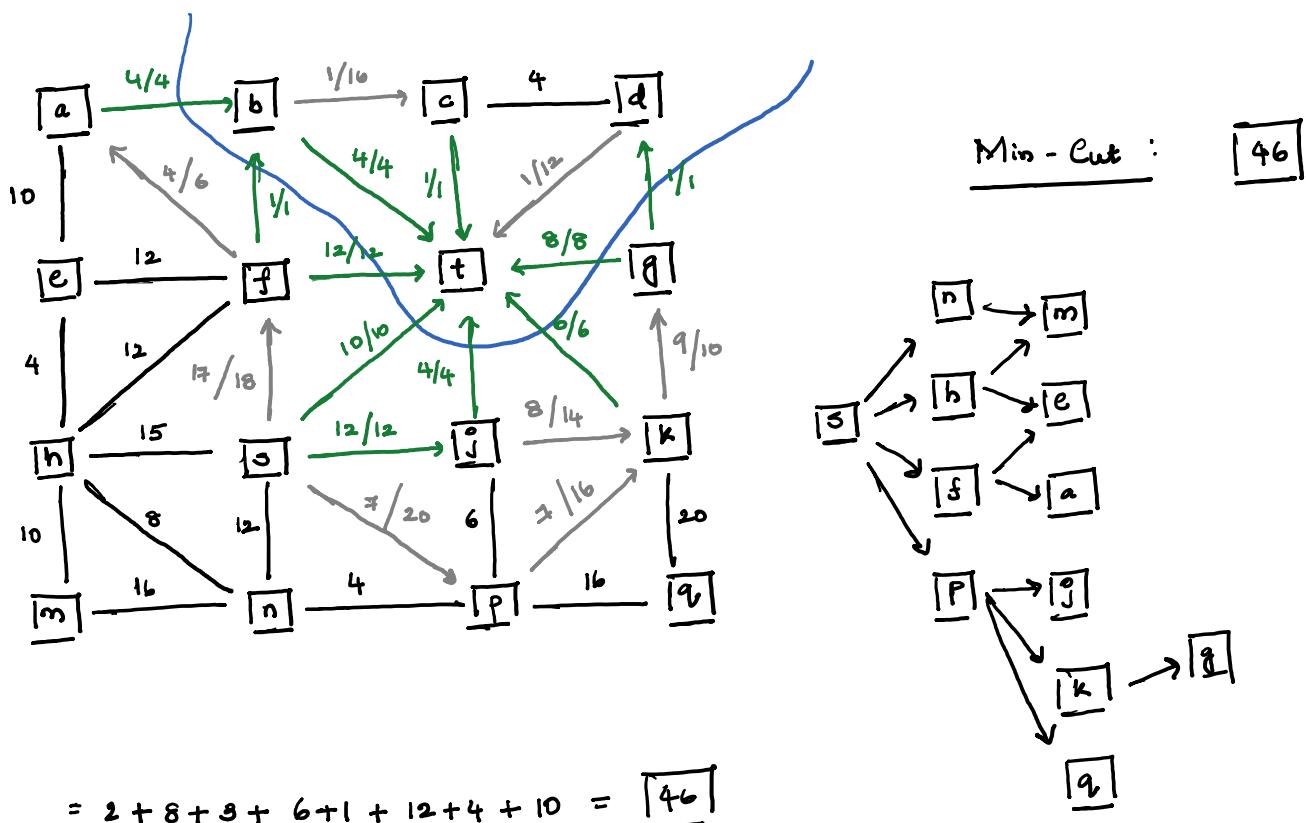


(4)

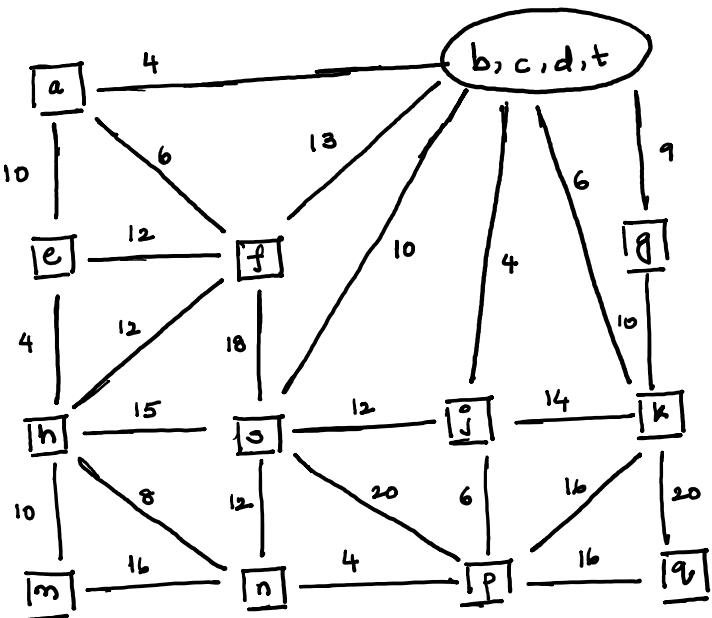
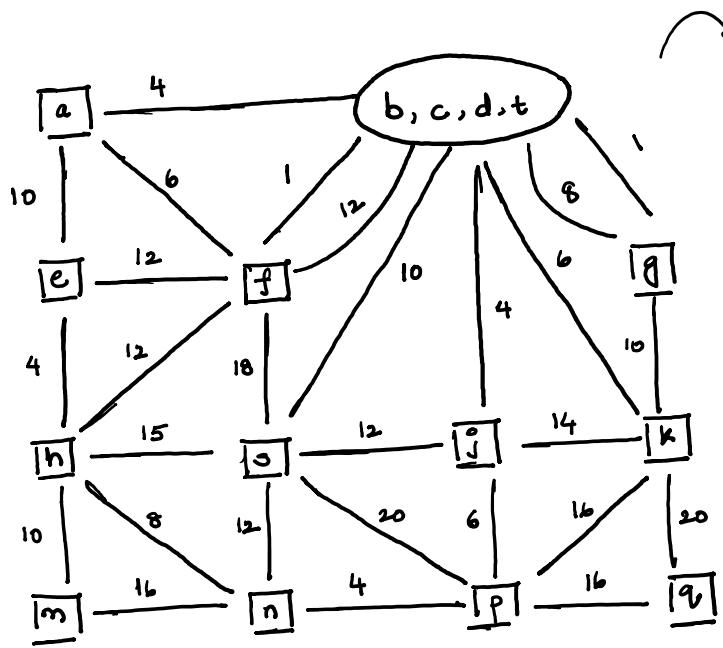
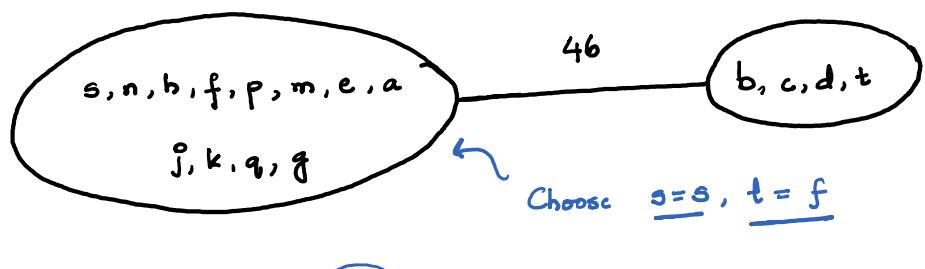


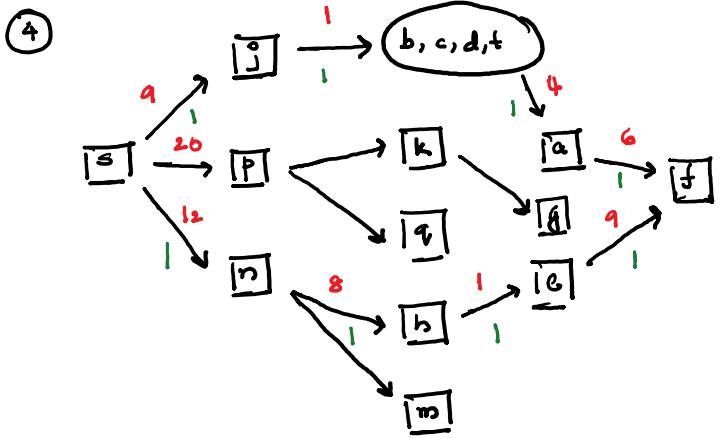
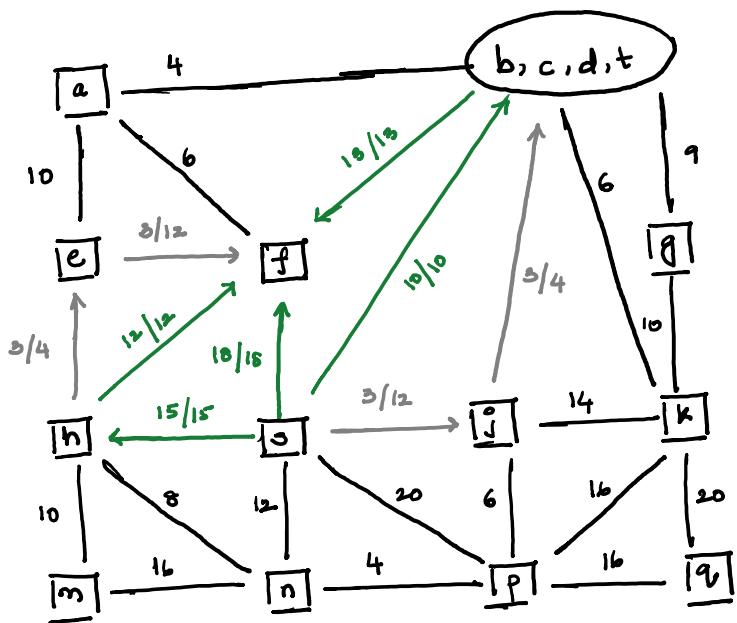
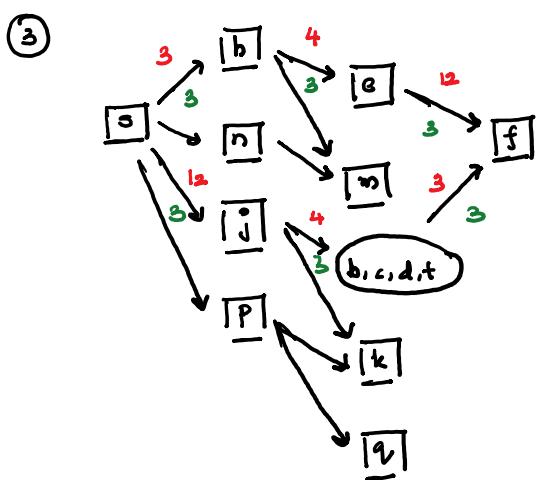
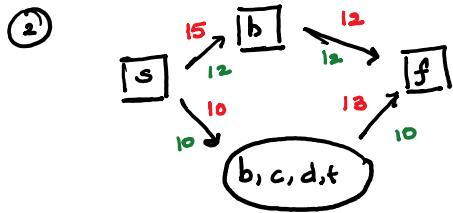
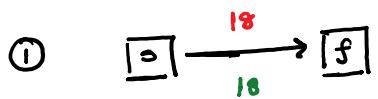
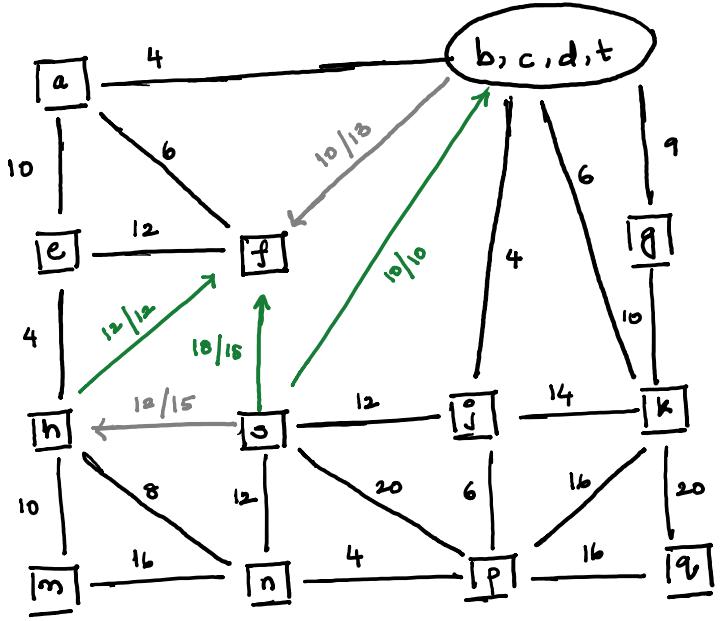
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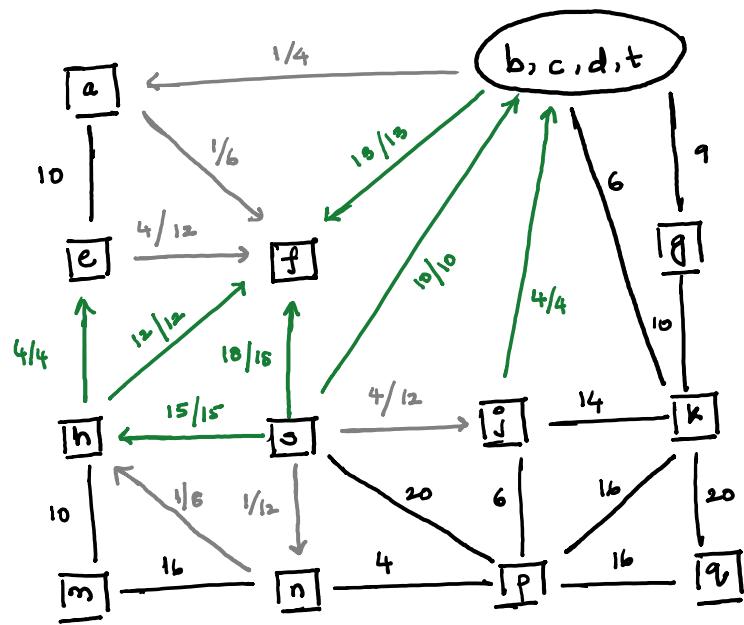




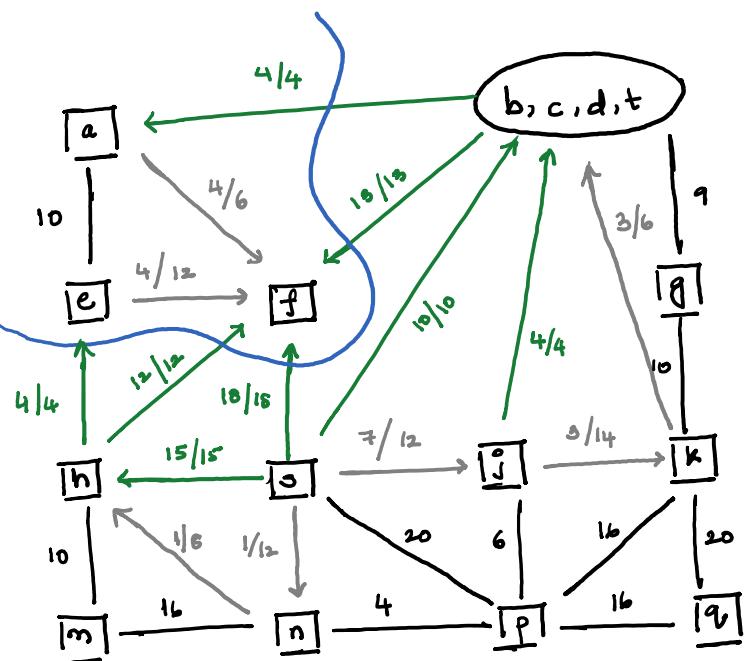
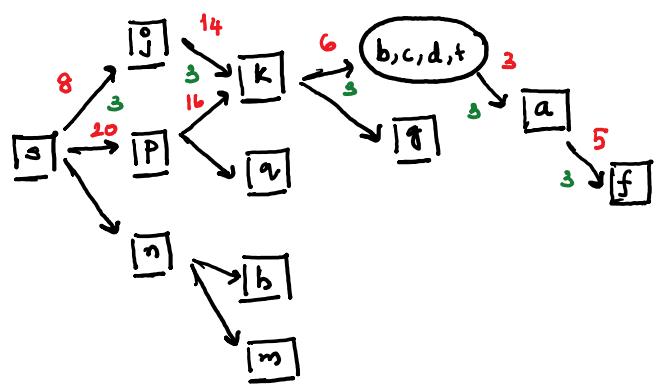
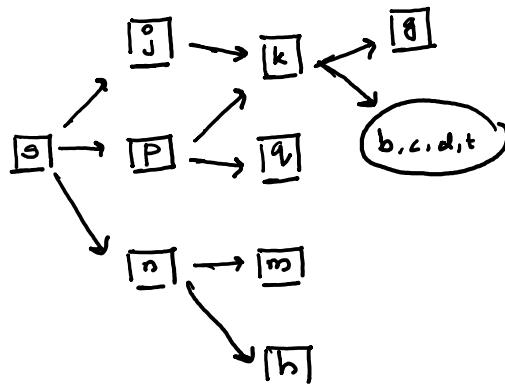
CUT-TREE :







⑤

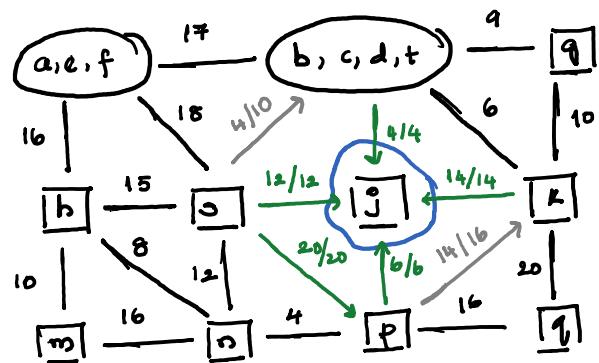
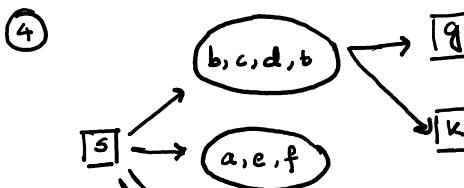
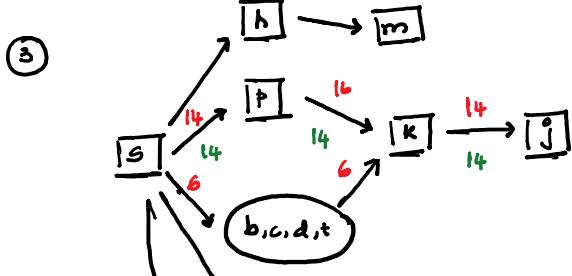
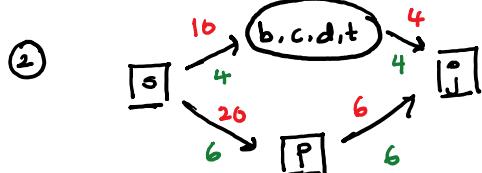
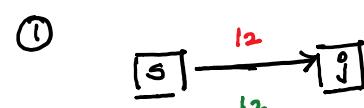
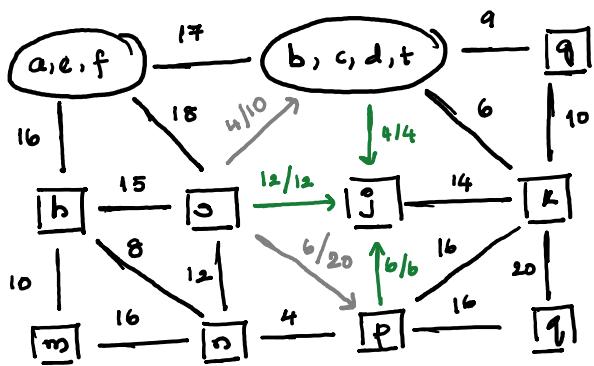
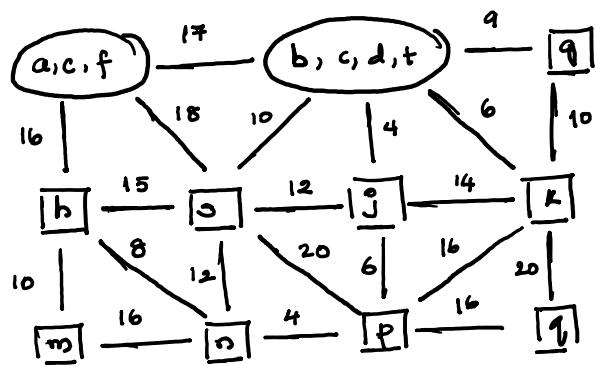
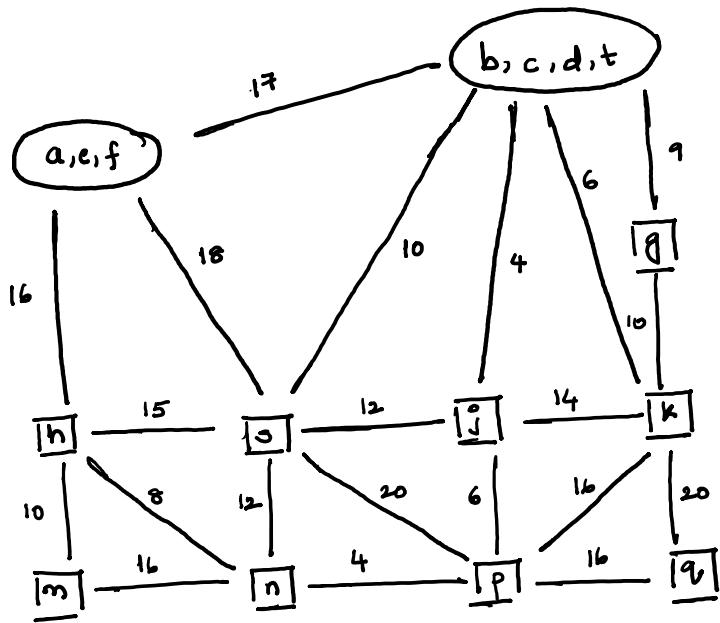
MIN-CUT :

Flow : 51

$$\frac{16 + 12 + 10 + 3 + 3 + 1 + 1 + 3}{= 51}$$

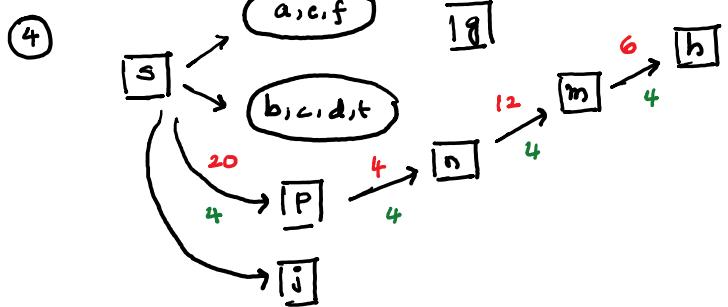
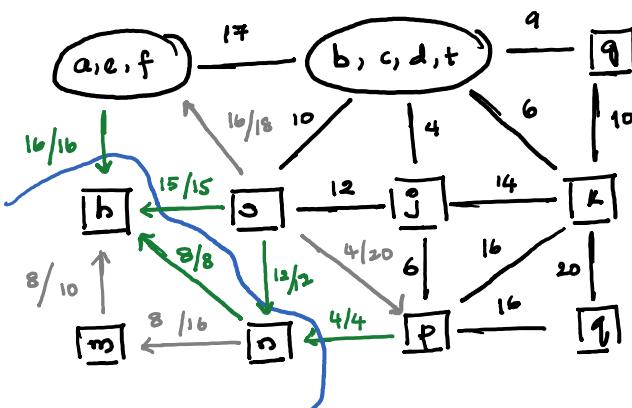
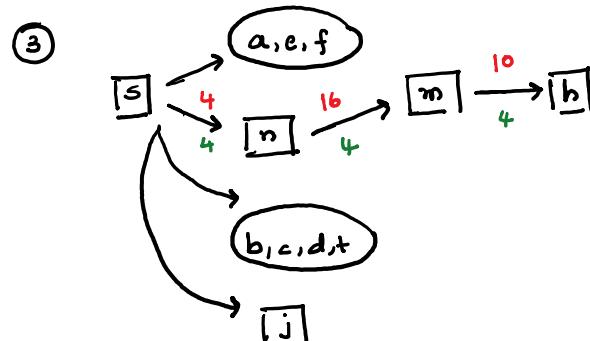
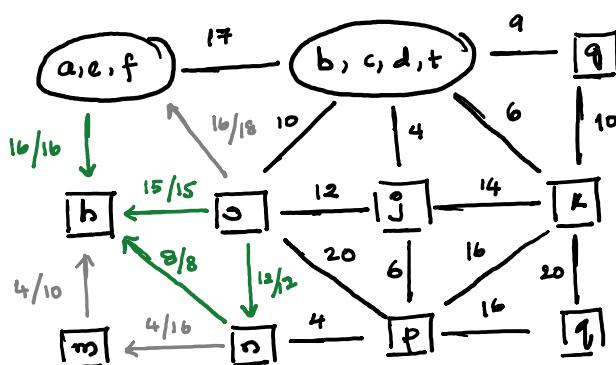
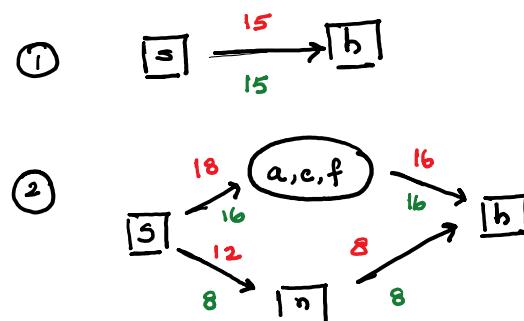
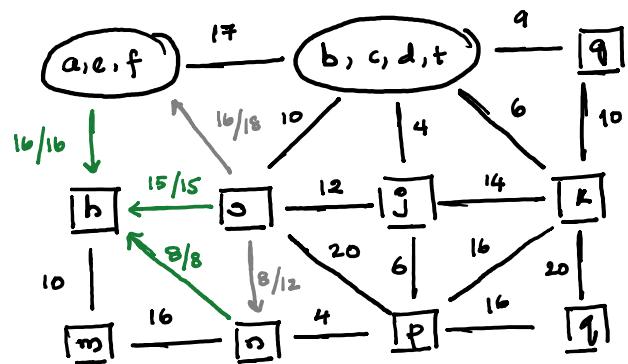
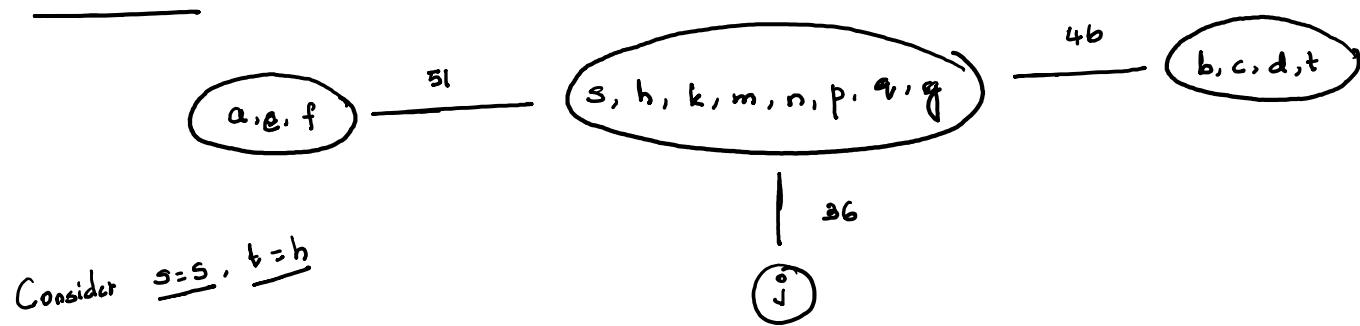
CUT-TREE :

$$\underline{s = s}, \underline{t = j}$$



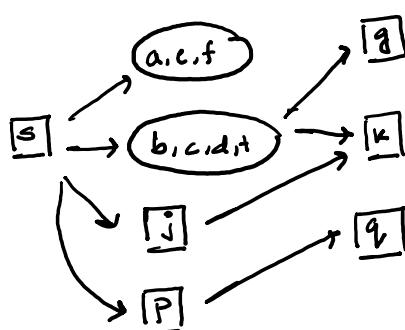
$$\text{Flow : } \underline{36} \quad | \quad 14 + 6 + 4 + 12 = \underline{36}$$

### CUT-TREE :

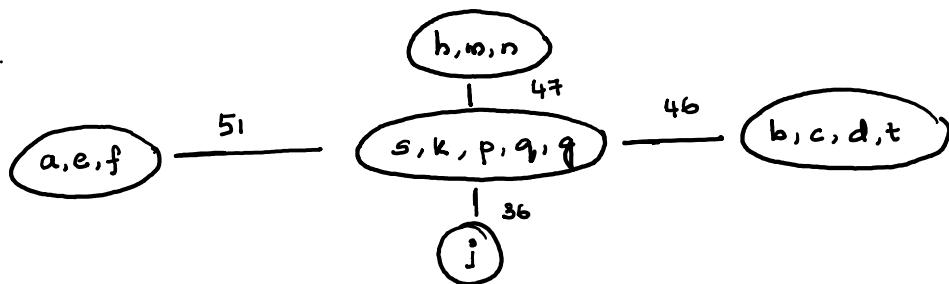


Flow : 47 |  $4+4+16+8+15 = \underline{47}$

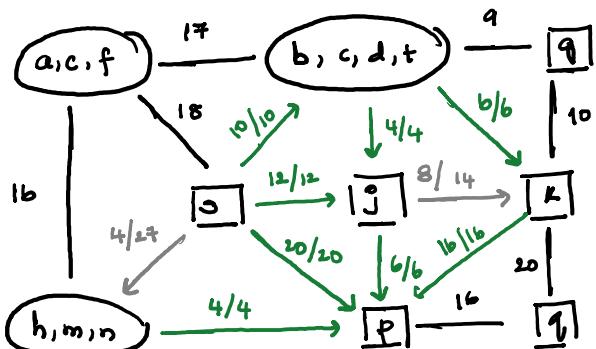
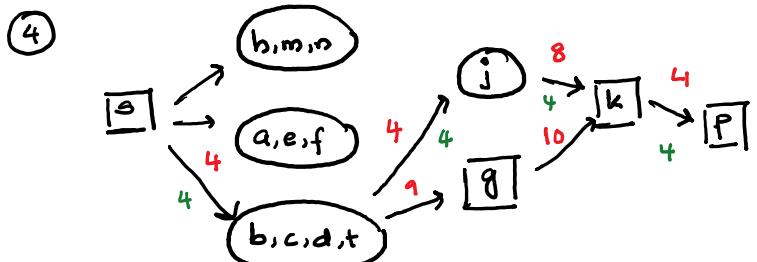
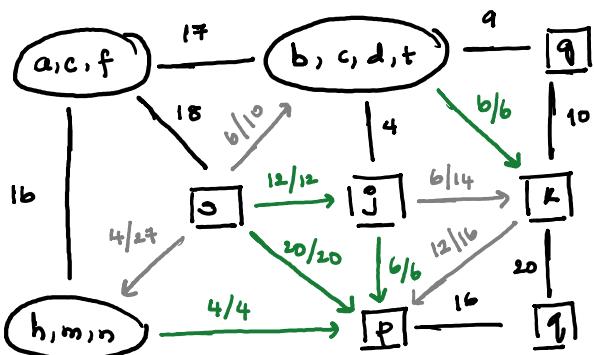
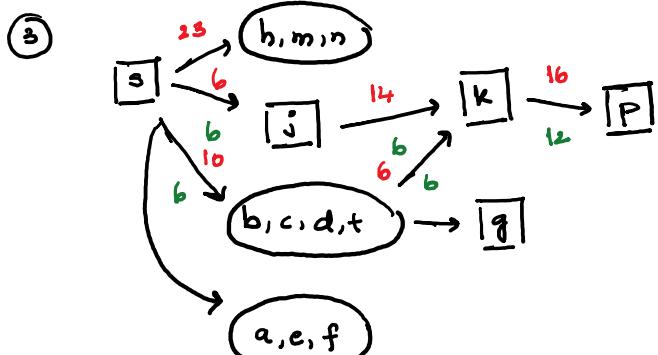
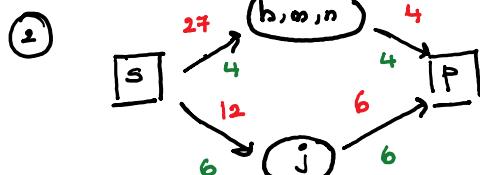
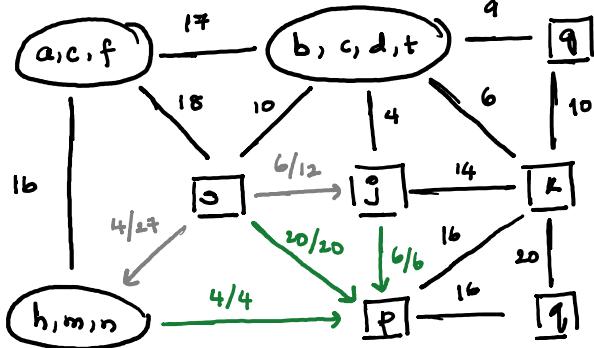
CUT :

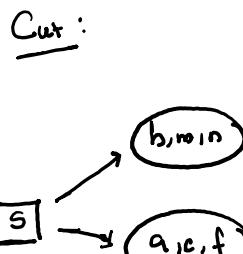
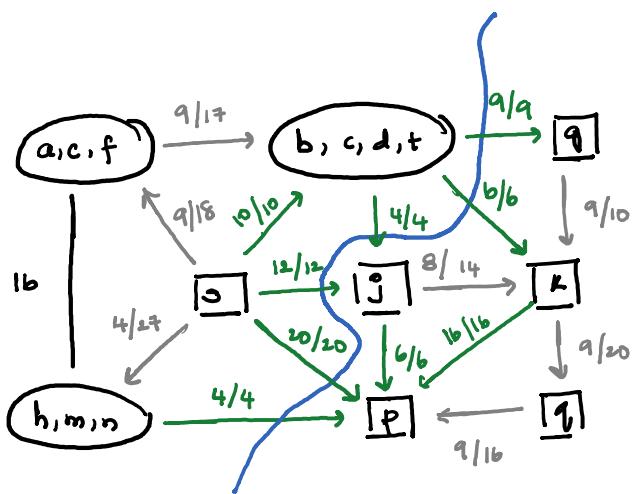


CUT-TREE:



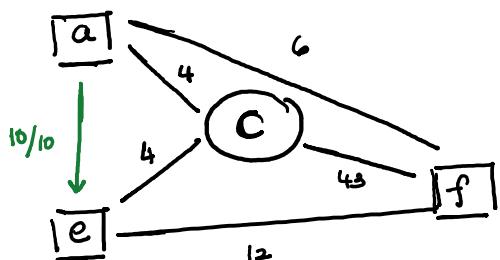
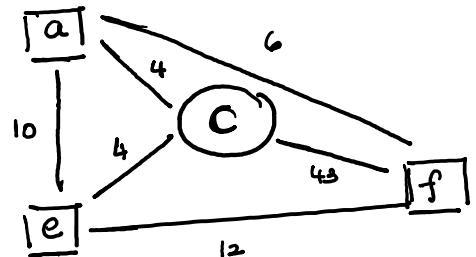
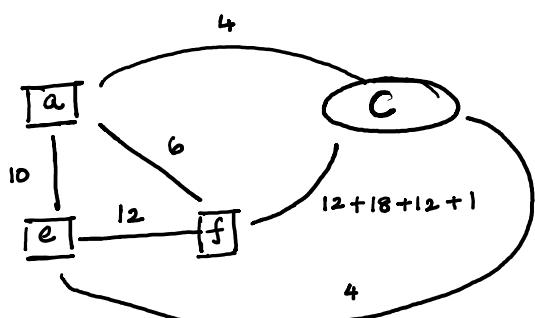
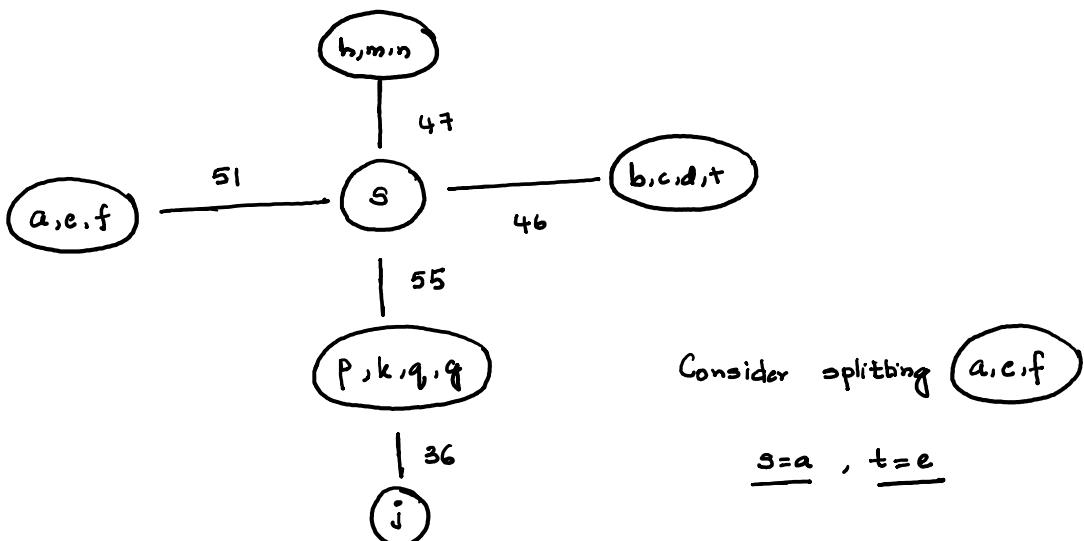
Consider  $S = S$ ,  $t = P$

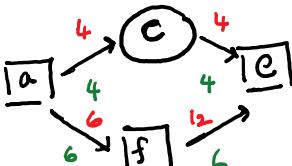


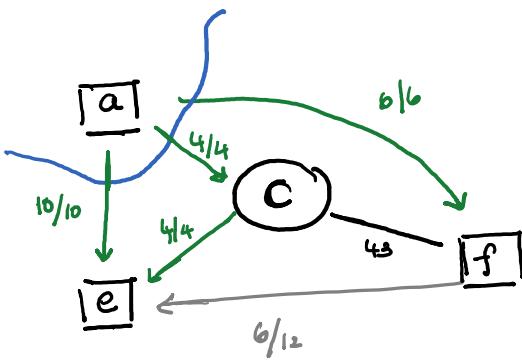


$$\text{Flow: } 55 \quad | \quad \underline{9+4+12+10} + \underline{20} = \underline{55}$$

CUT-TREE:



- ① 
- ② 

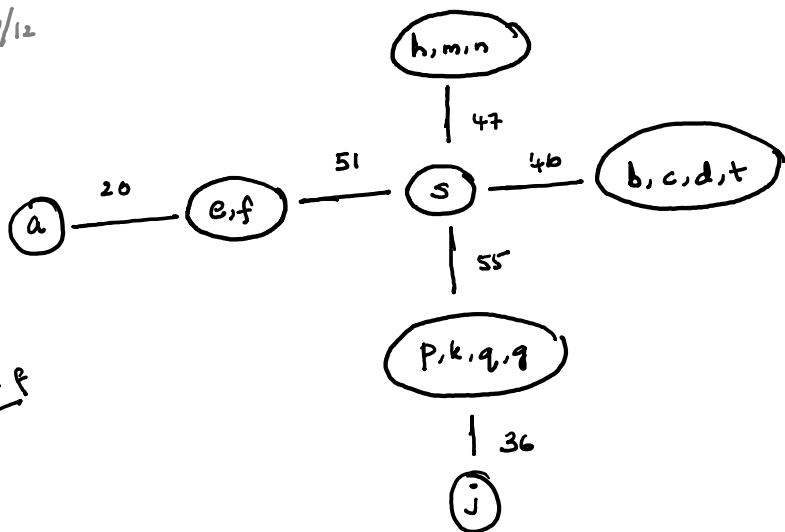


CUT:

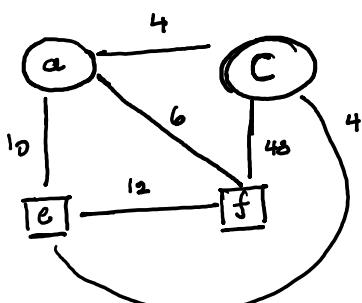
[a]

$$\underline{\text{Flow}}: 20 \quad | \quad 4+6+10 = \underline{20}$$

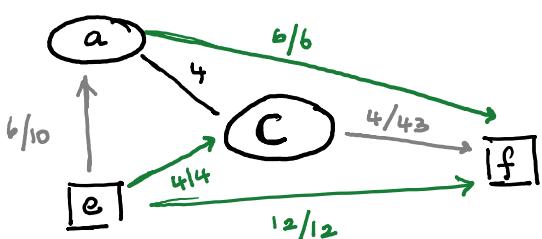
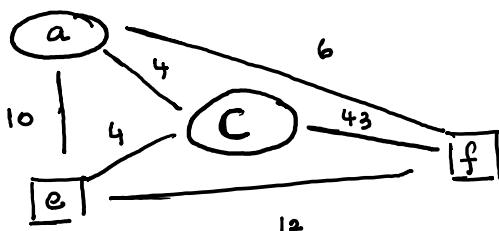
CUT-TREE:



Consider  $s=c, t=f$



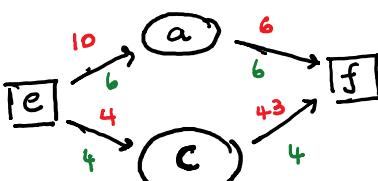
$\Rightarrow$



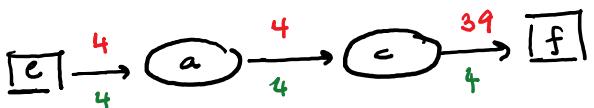
①

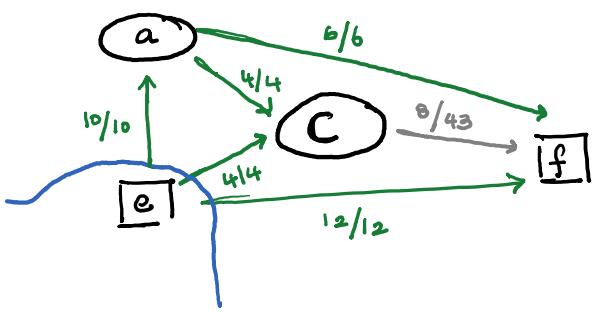


②



③



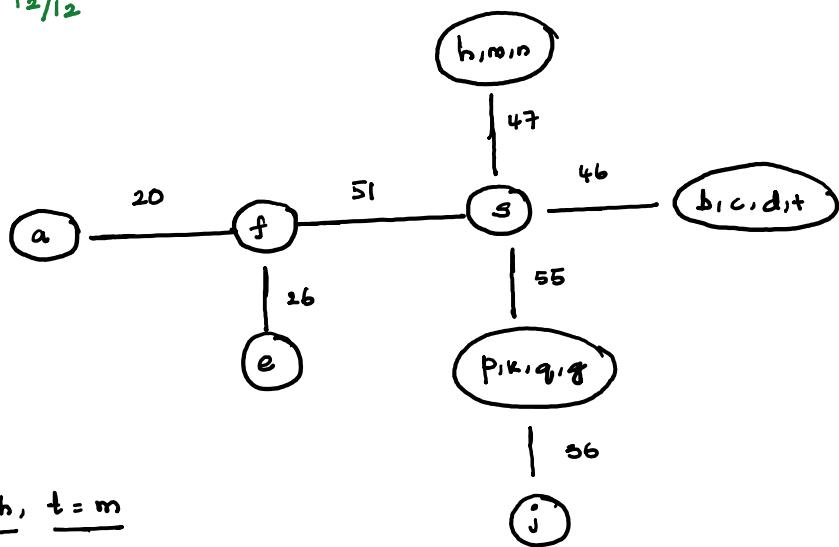


Cut:

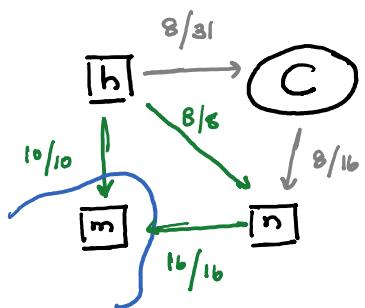
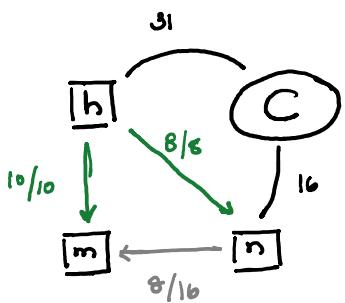
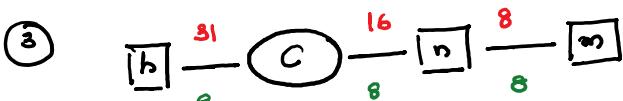
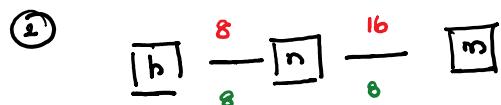
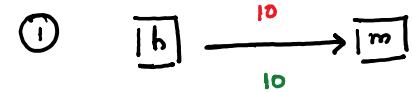
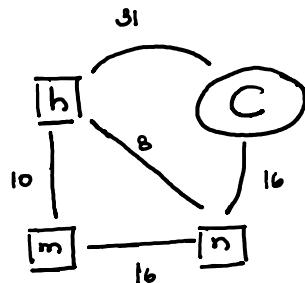
$$\text{Flow} : \underline{26} \quad | \quad 4+6+4+12 = \underline{26}$$

$\boxed{e}$

CUT-TREE:



Considering  $s=h$ ,  $t=m$

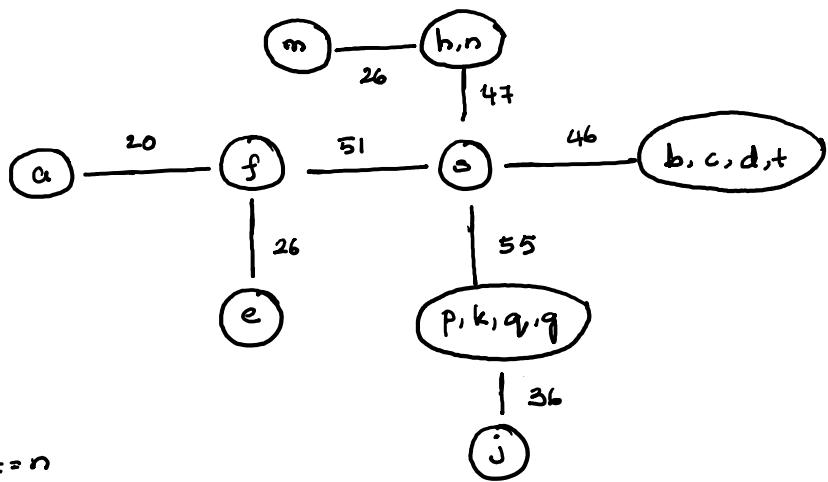


Cut

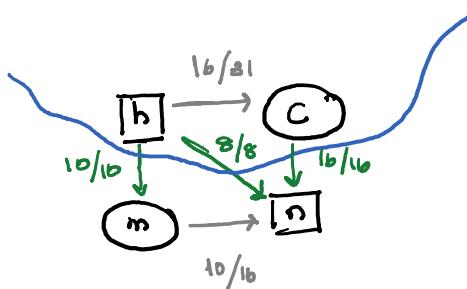
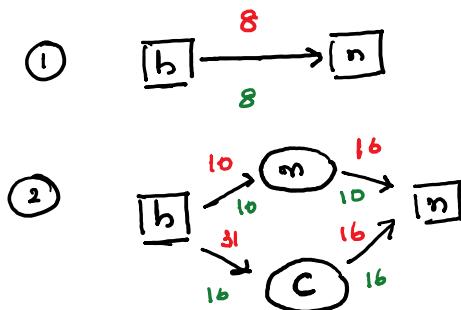
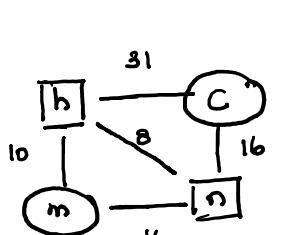


$$\text{Flow} : \underline{26} \quad | \quad 10+8+8 = \underline{26}$$

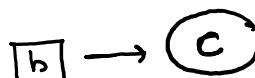
CUT-TREE :



Consider  $s=h, t=n$

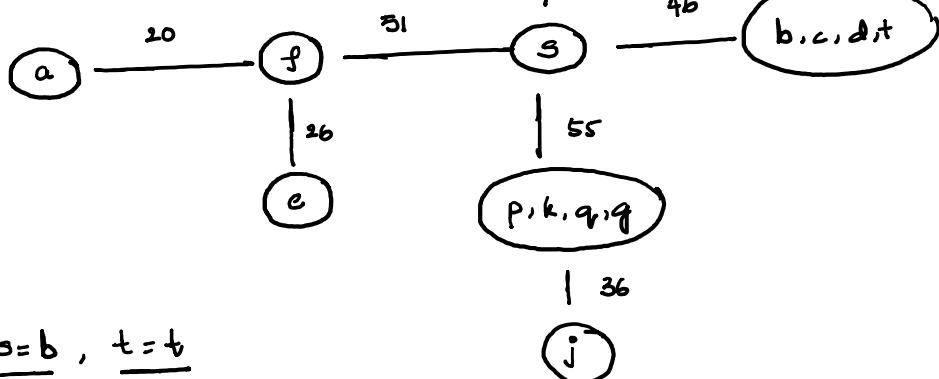


Cut :

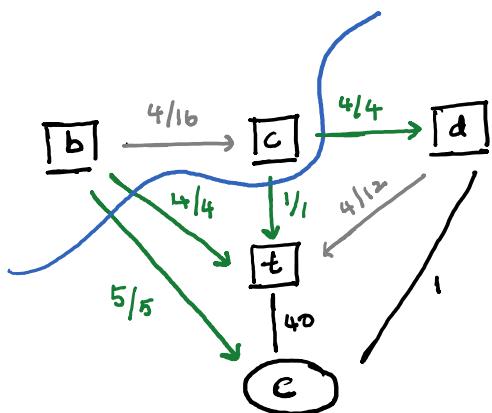
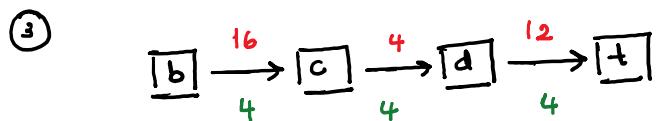
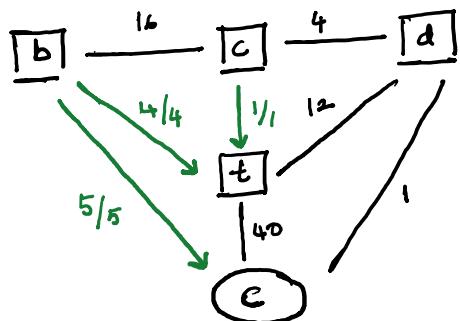
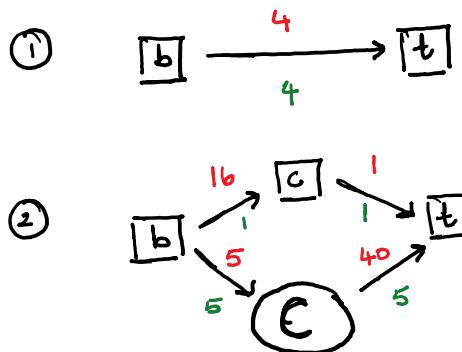
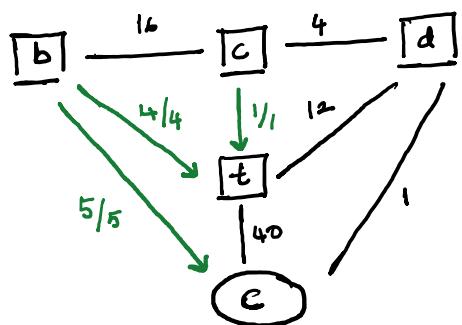


$$\text{flow : } \underline{34} \quad | \quad 10+8+16 = \underline{34}$$

Cut tree :



Consider  $s=b, t=t$

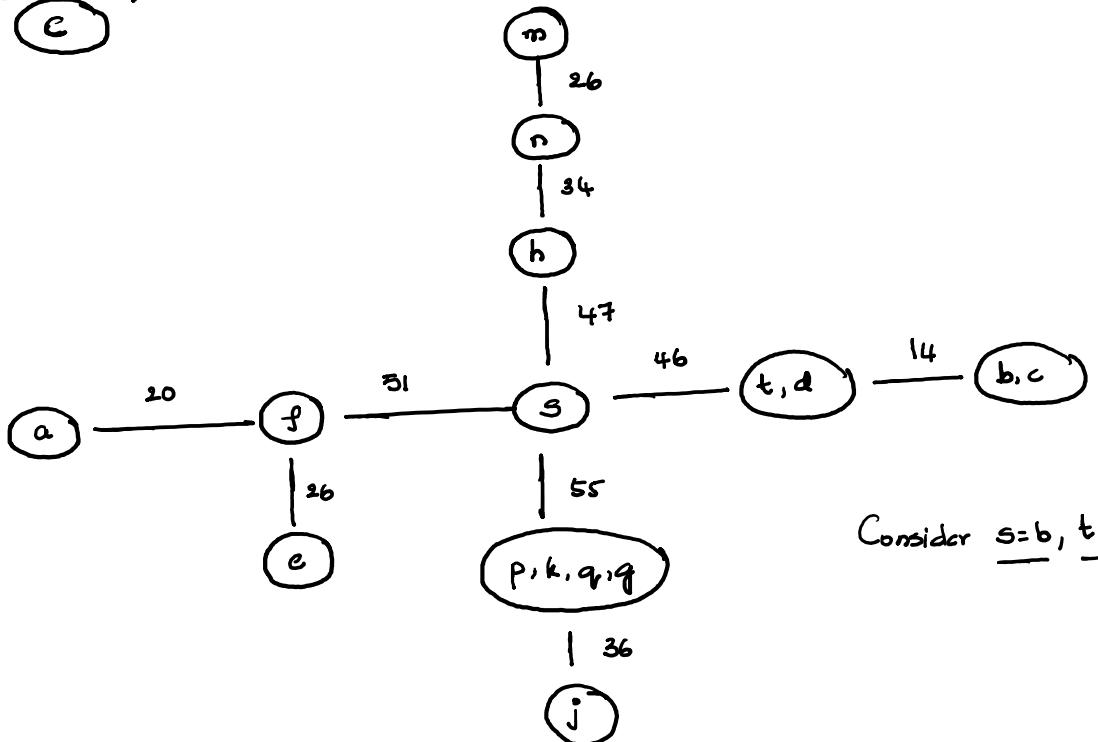


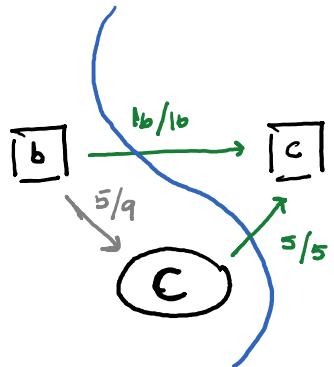
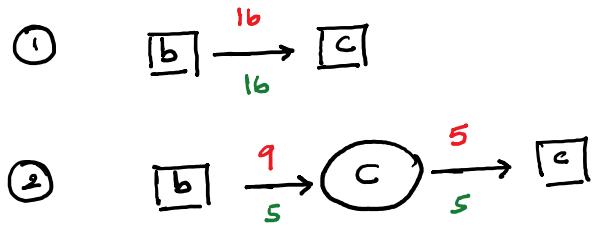
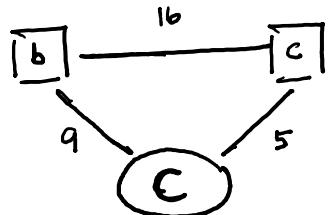
Mincut :



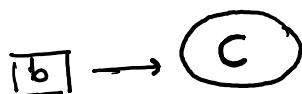
$$\text{Flow : } \underline{14} \quad | \quad 4+4+6 = \underline{14}$$

Cut-tree :



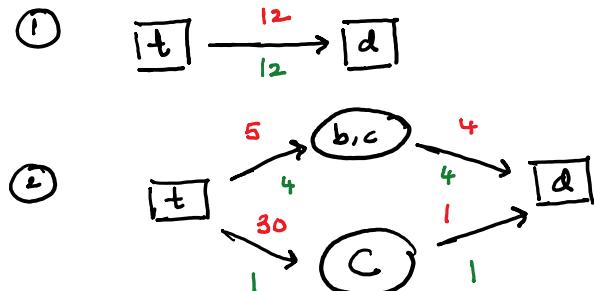
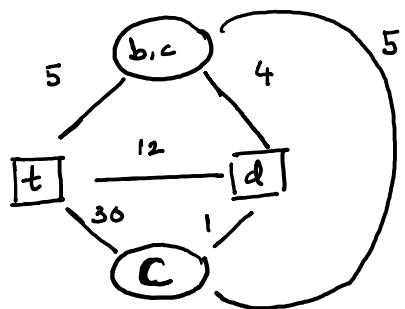
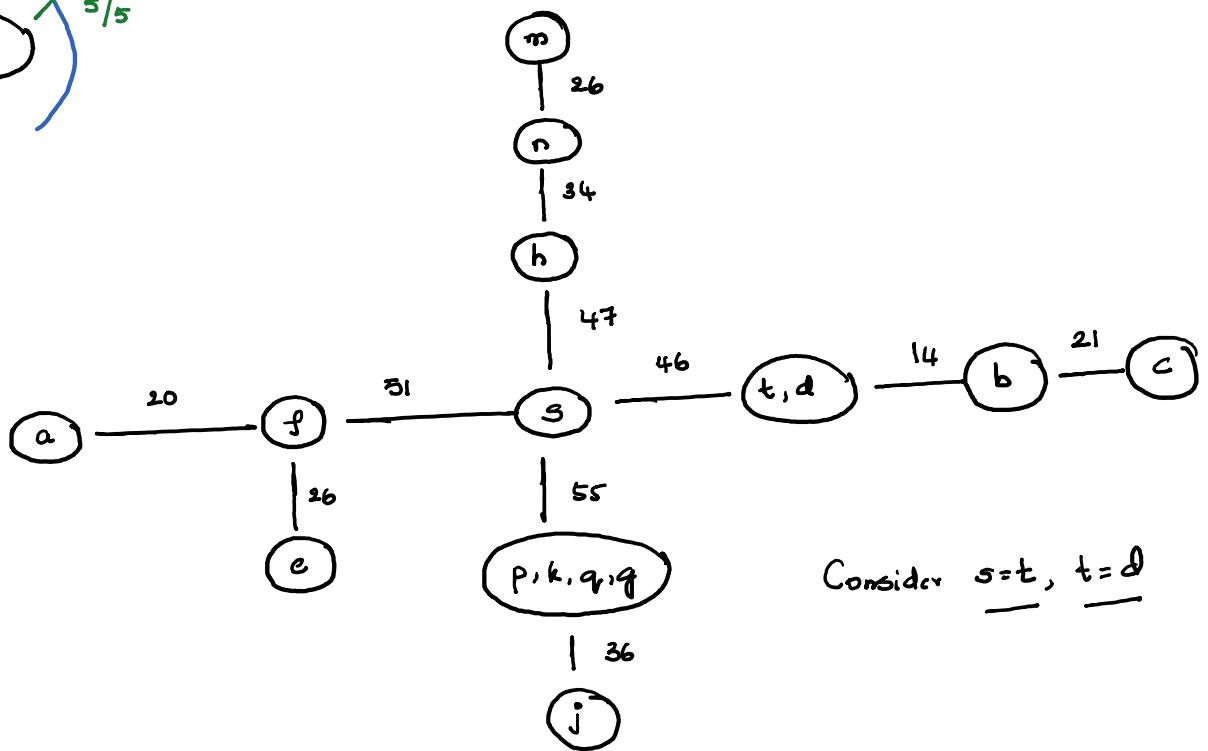


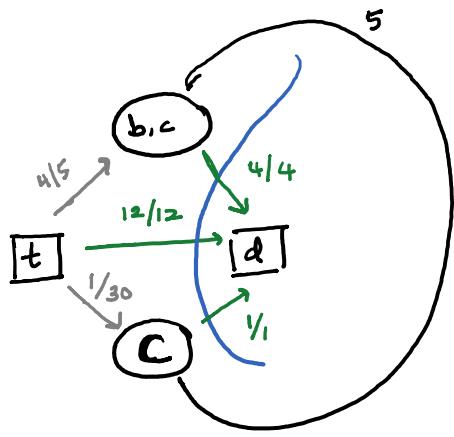
Minimum-cut :



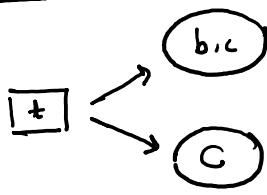
$$\text{Flow : } 21 \quad | \quad 5 + 16 = 21$$

Cut-tree



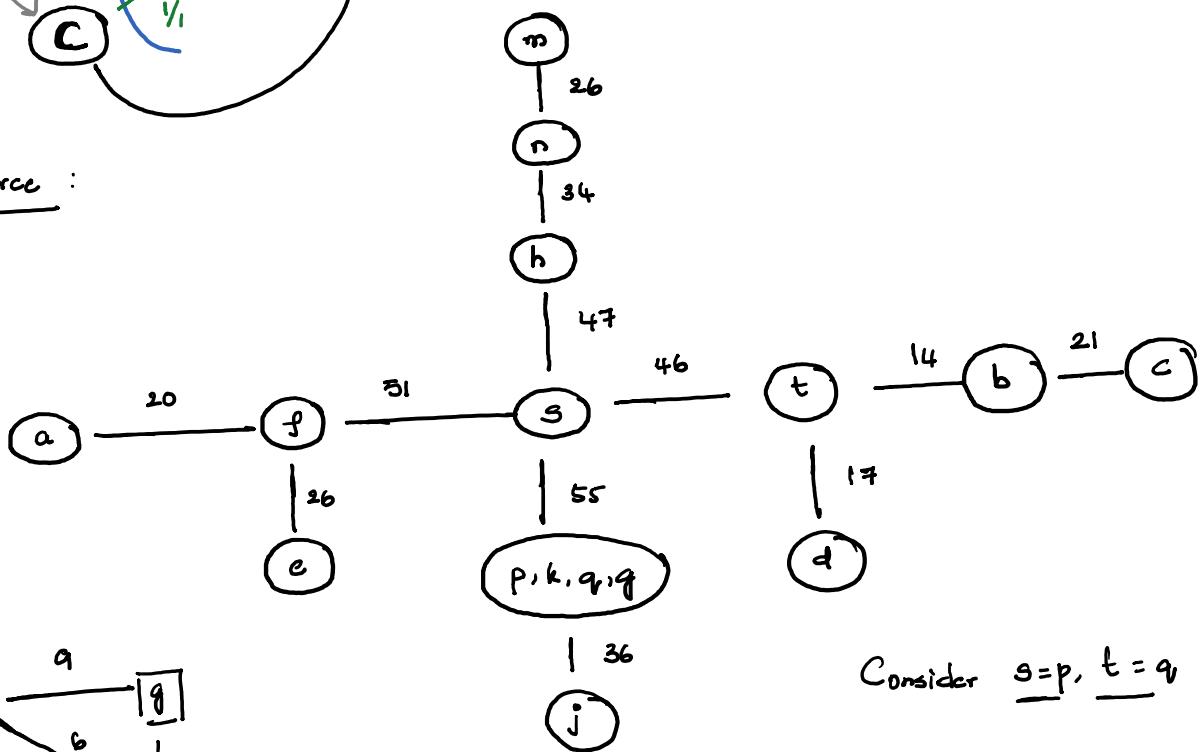


Min-cut :

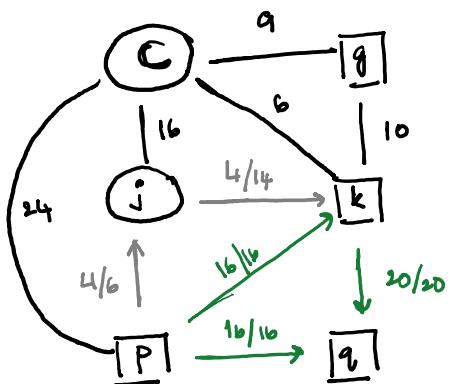
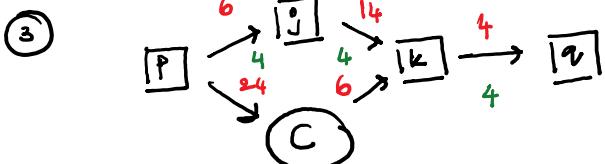
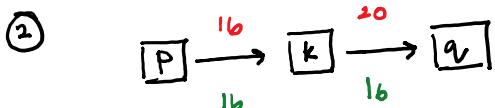
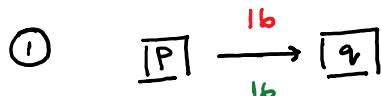
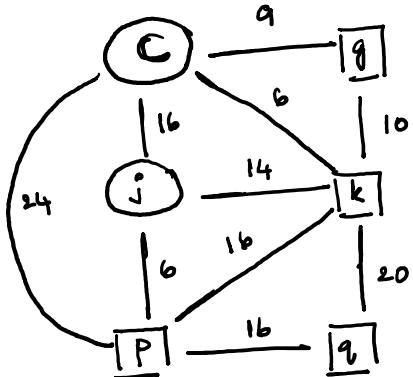


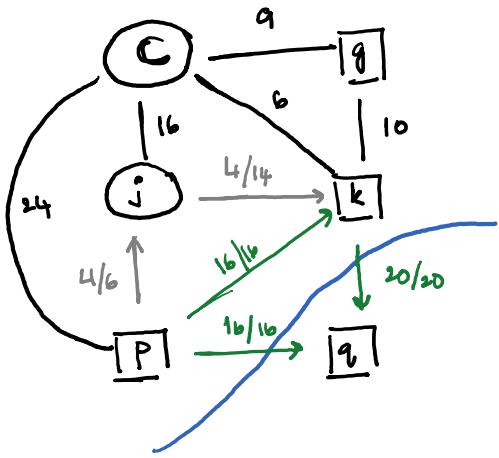
$$\text{Flow: } 17 \quad | \quad 12 + 4 + 1 = 17$$

Cut-tree :

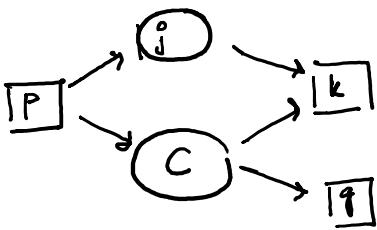


Consider  $s=p$ ,  $t=q$



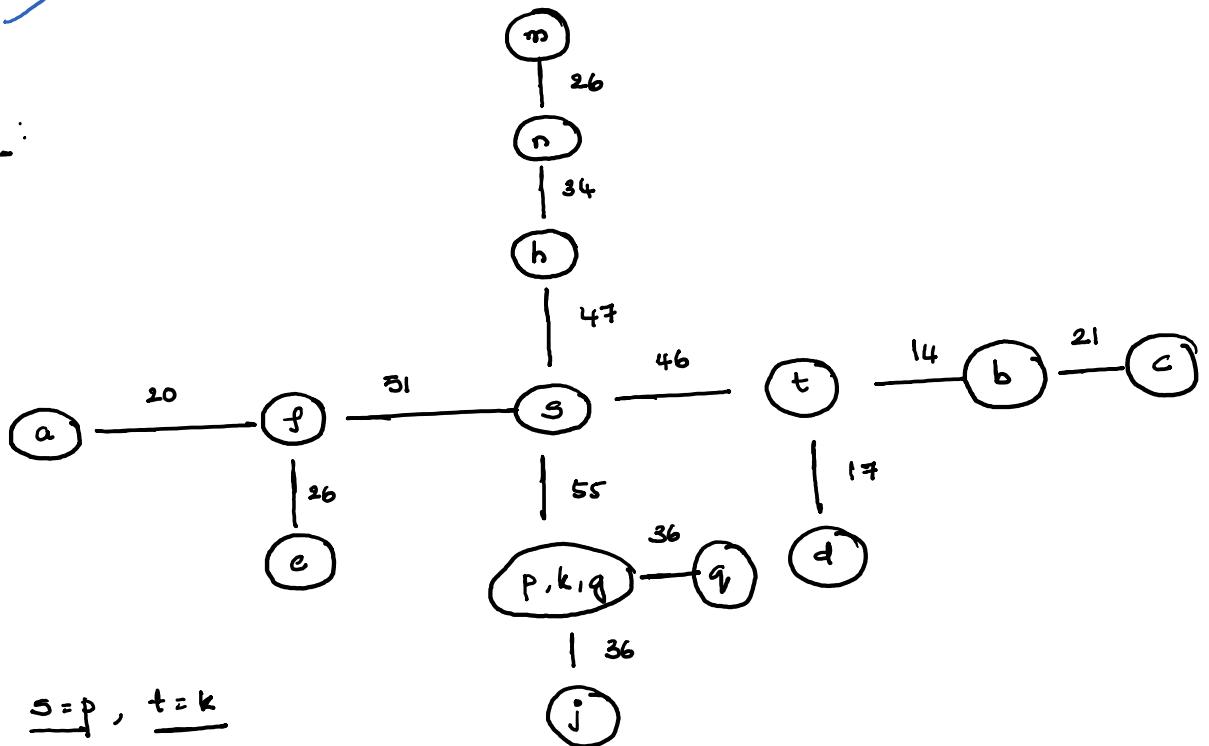


Min-cut:

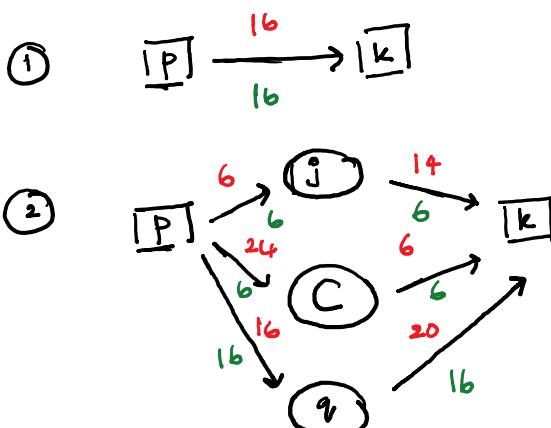
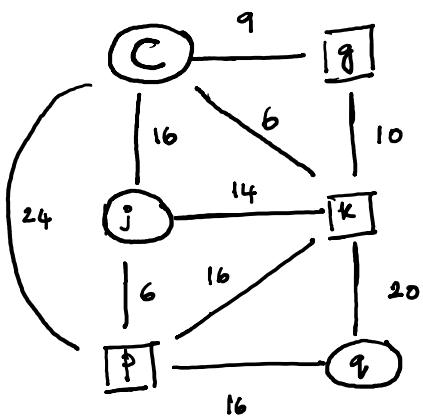


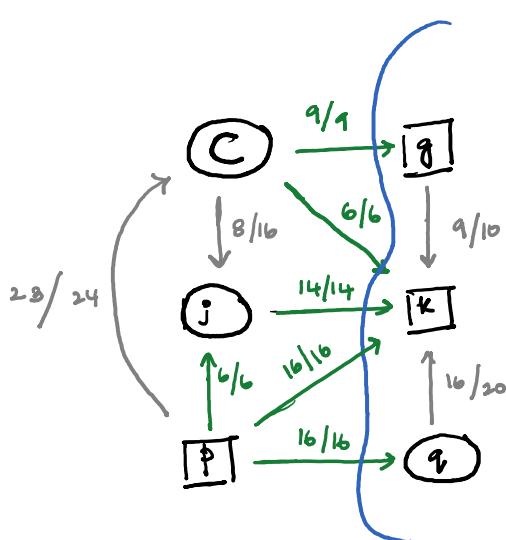
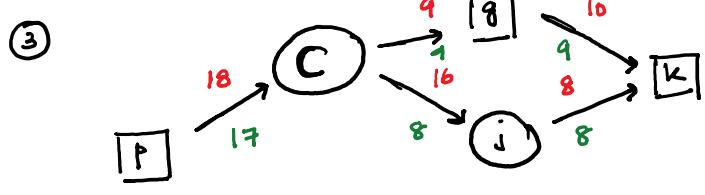
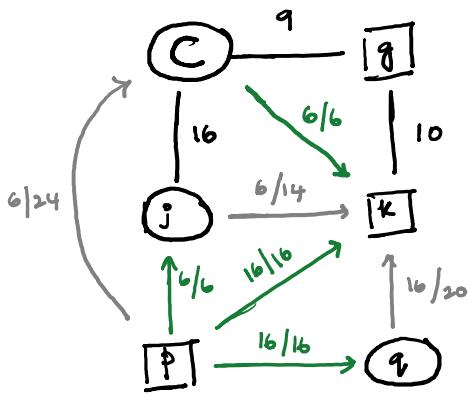
$$\text{Flow : } 36 \quad | \quad 4+16+16 \\ = 36$$

Cut-tree:



Consider  $s=p$ ,  $t=k$



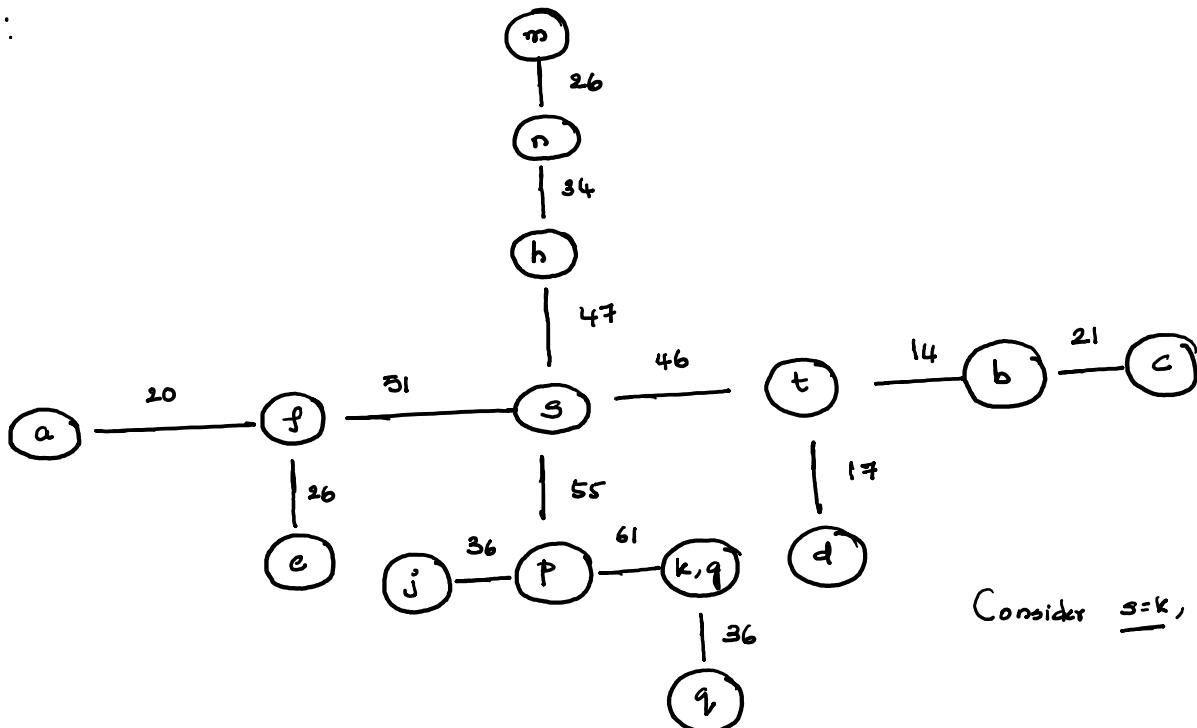


Min-cut :

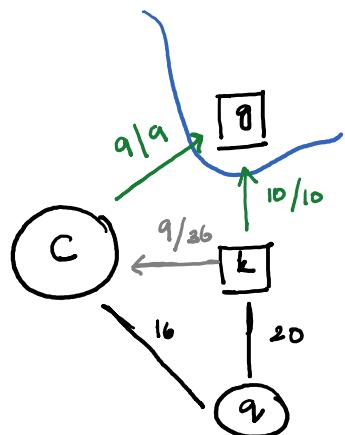
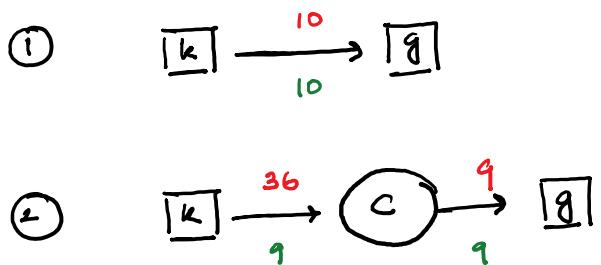
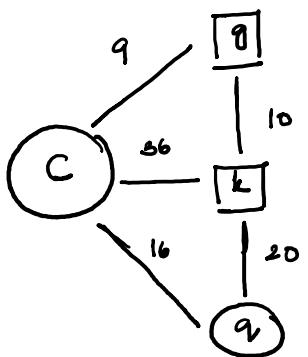


$$\text{Flow : } 61 \quad | \quad 17 + 16 + 6 + 6 + 16 = \underline{\underline{61}}$$

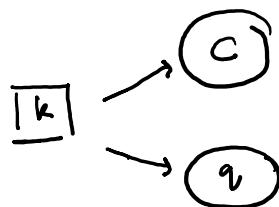
Cut-tree :



Consider s=k, t=q

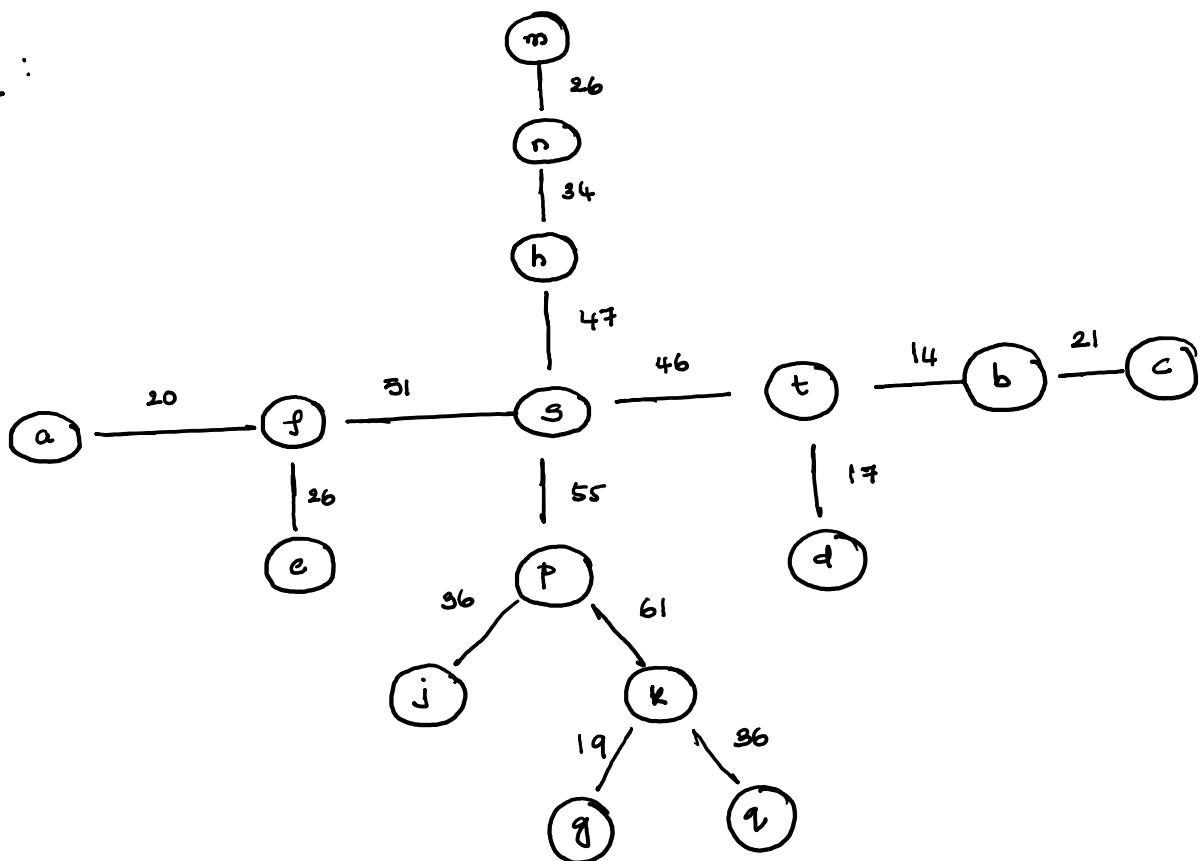


Min-cut:



$$\text{flow: } 19 \quad | \quad 10+9=19$$

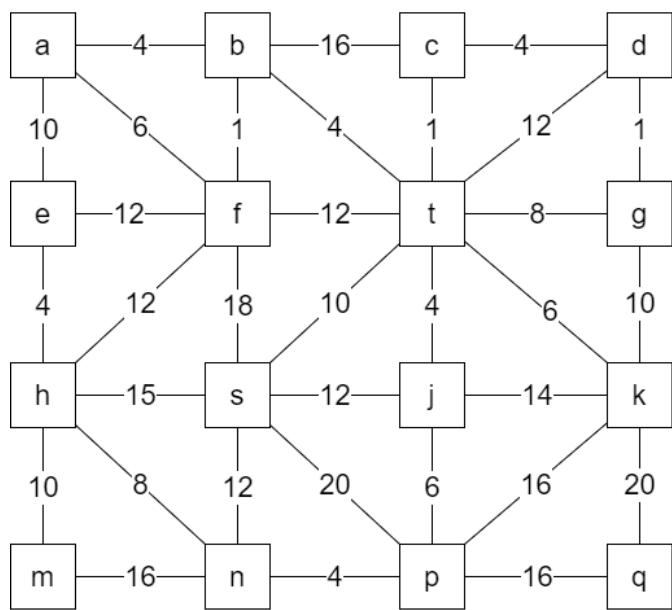
Cut-trace:



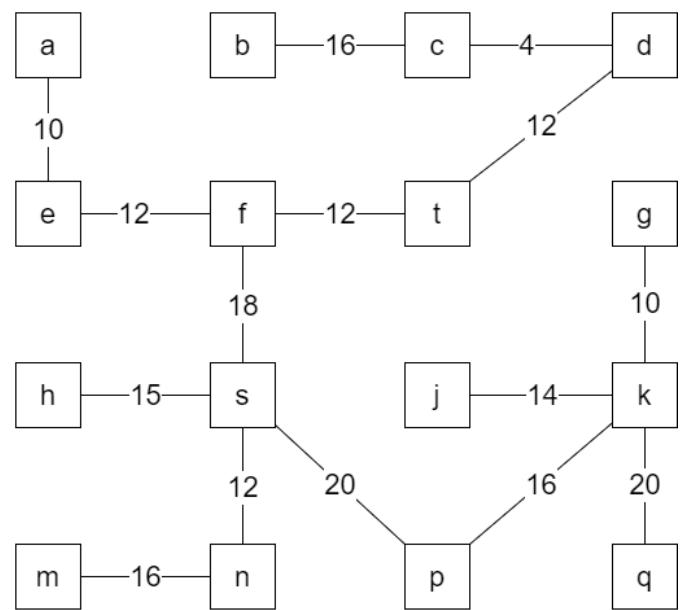
## PART - 2

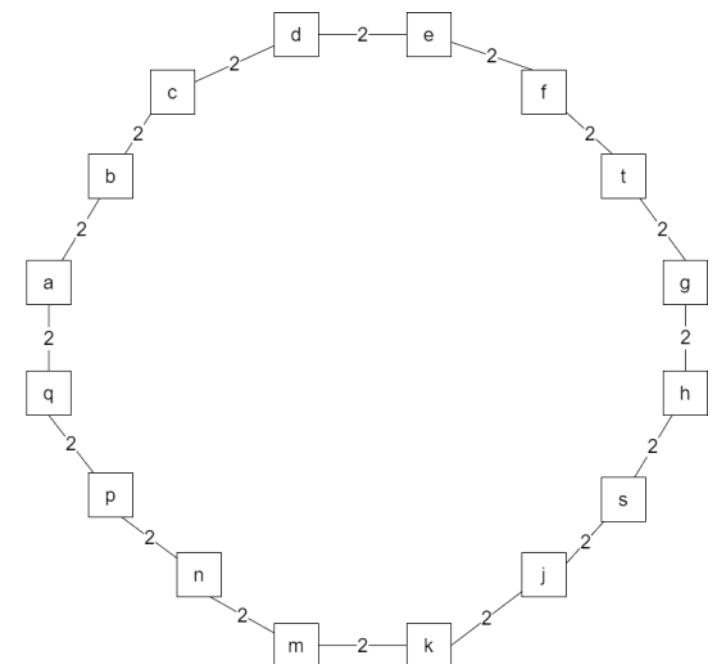
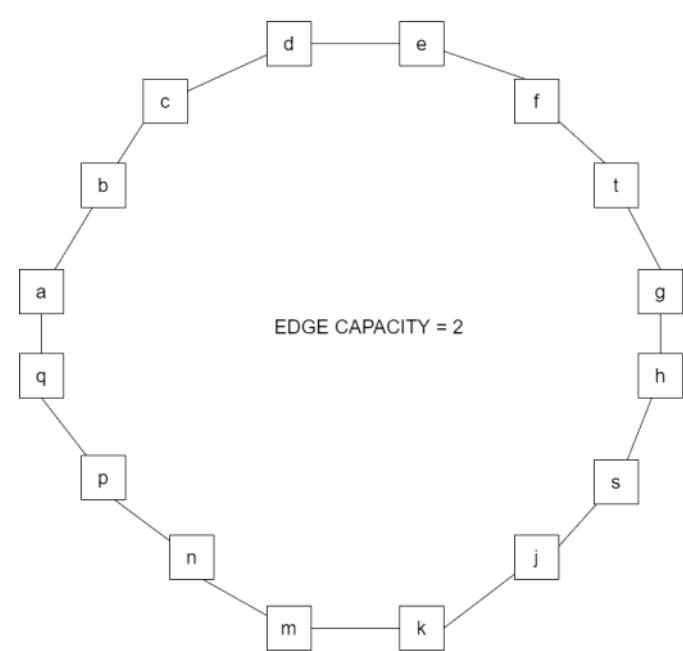
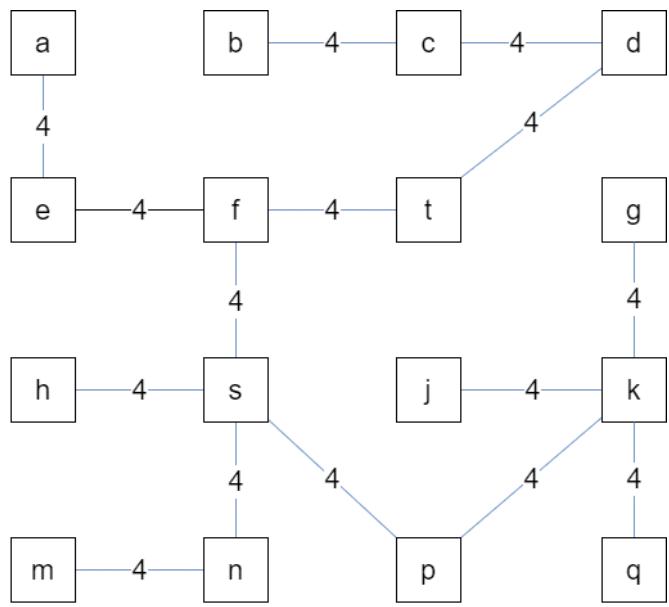
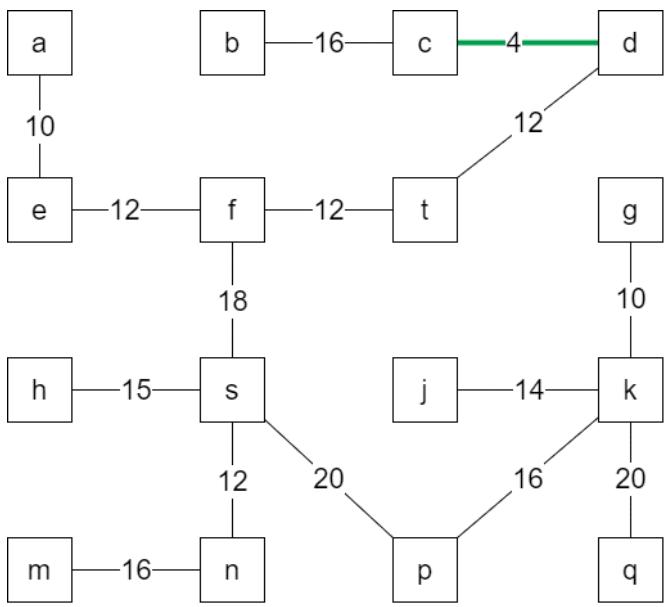
### SYNTHESIS ALGORITHM - 1

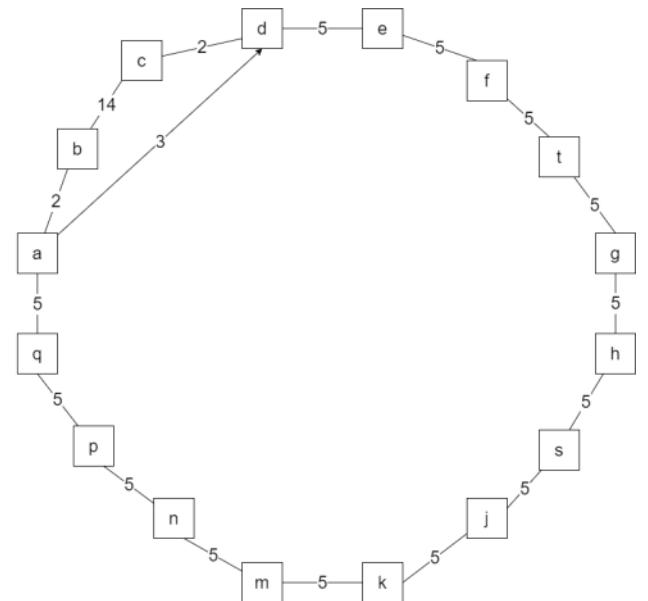
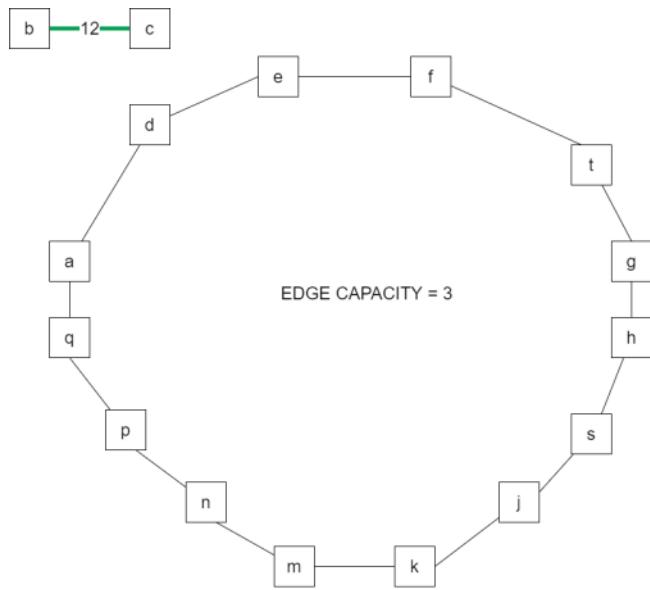
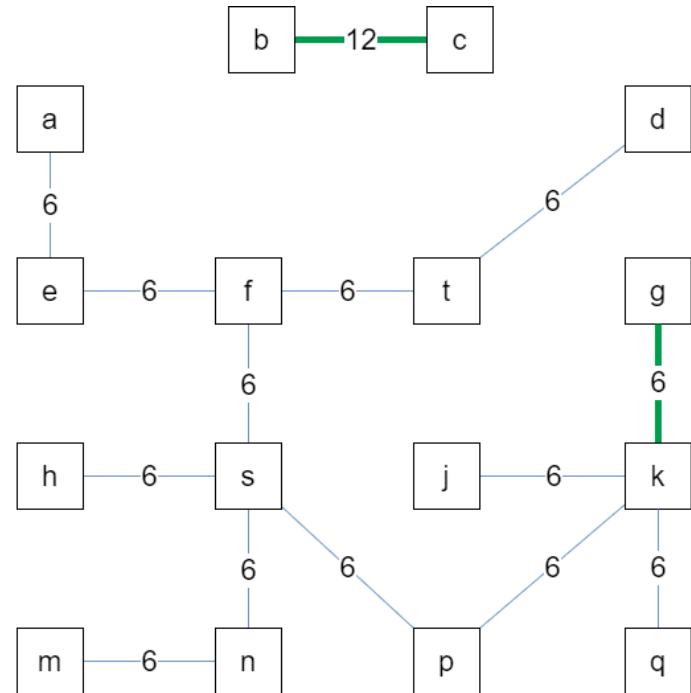
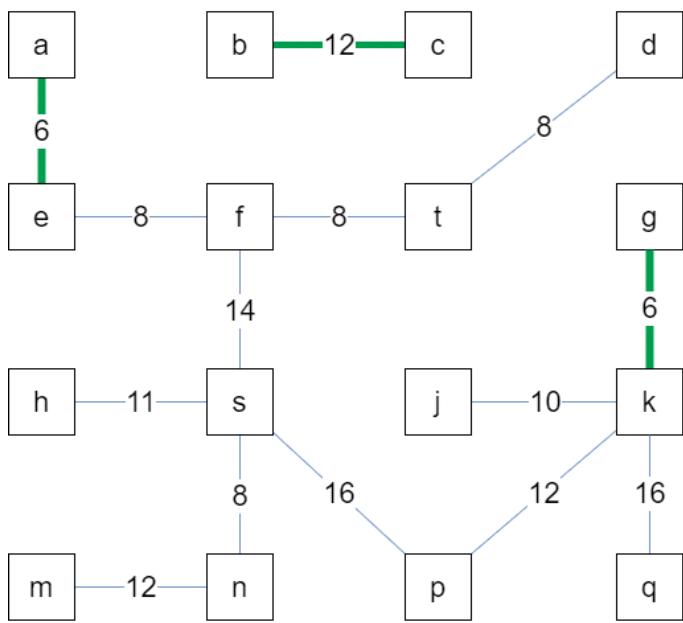
PROBLEM GRAPH

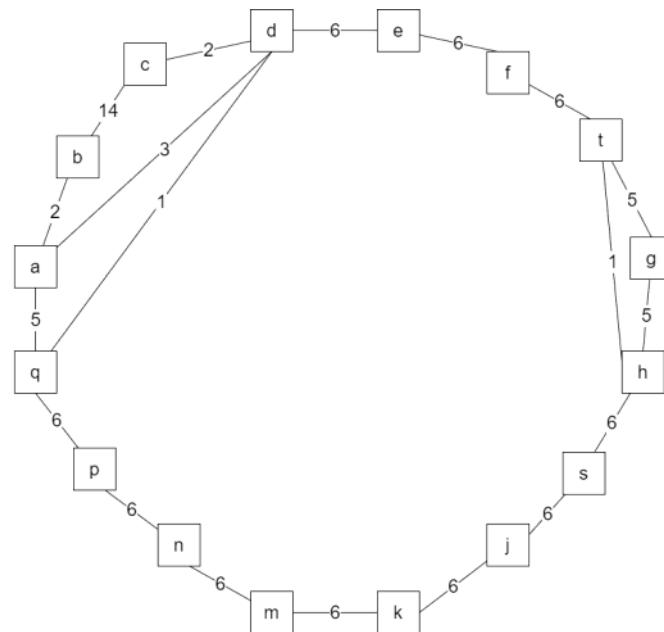
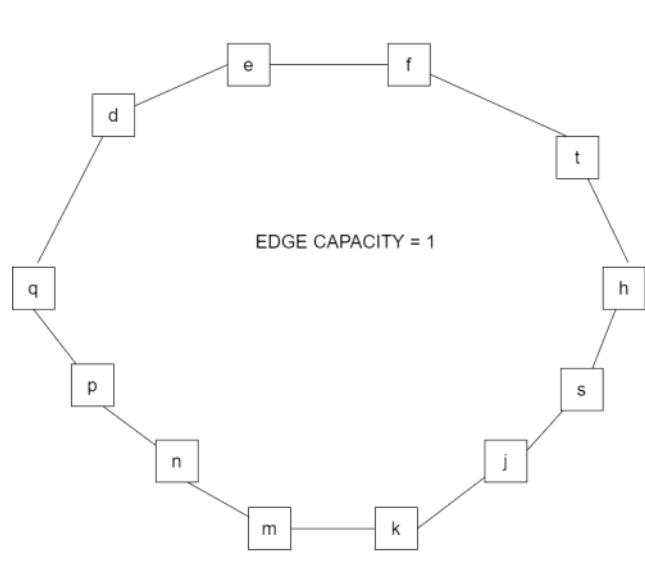
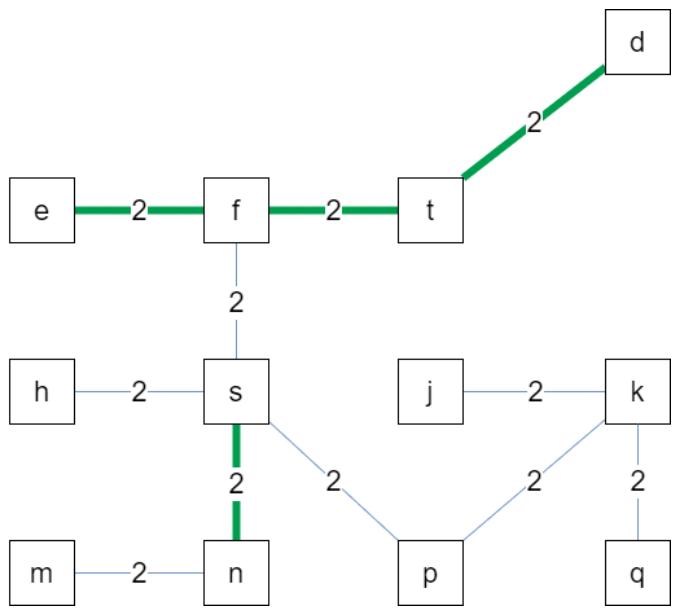
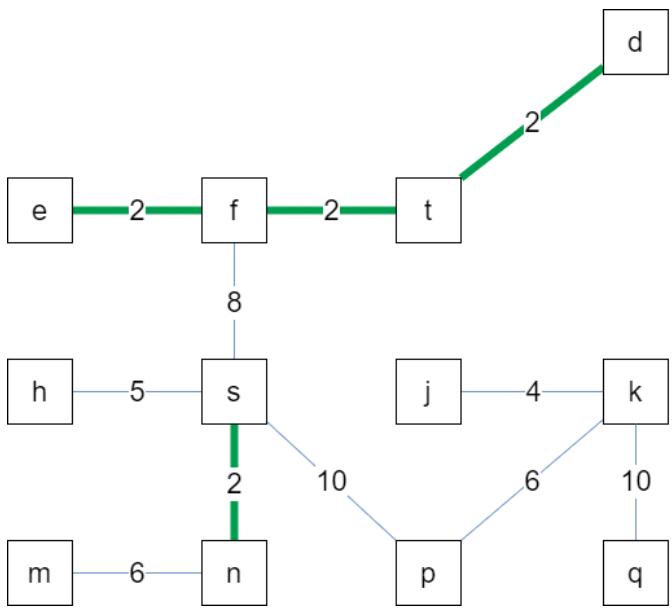


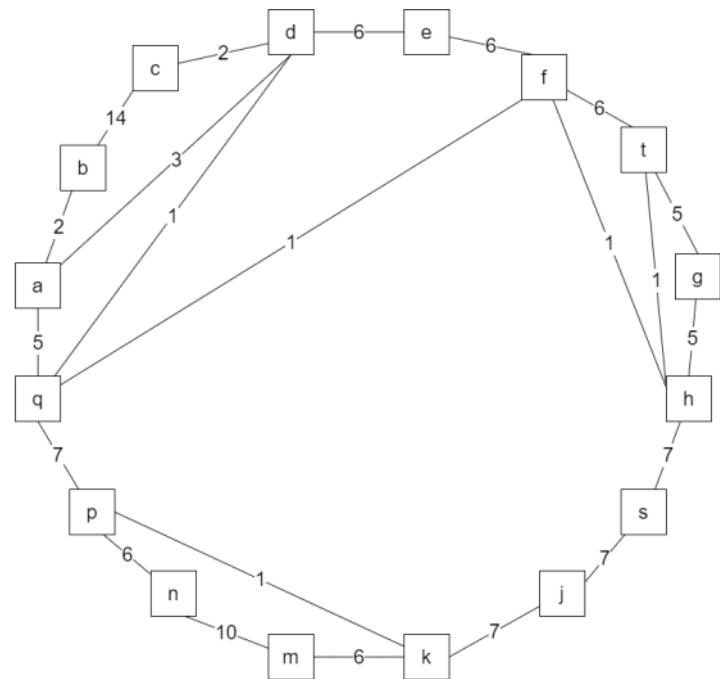
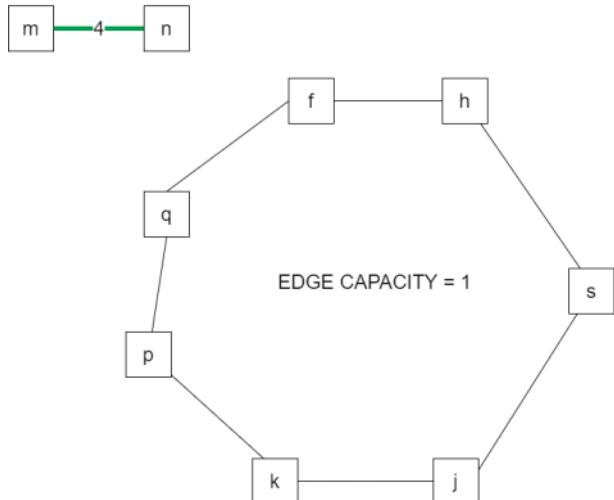
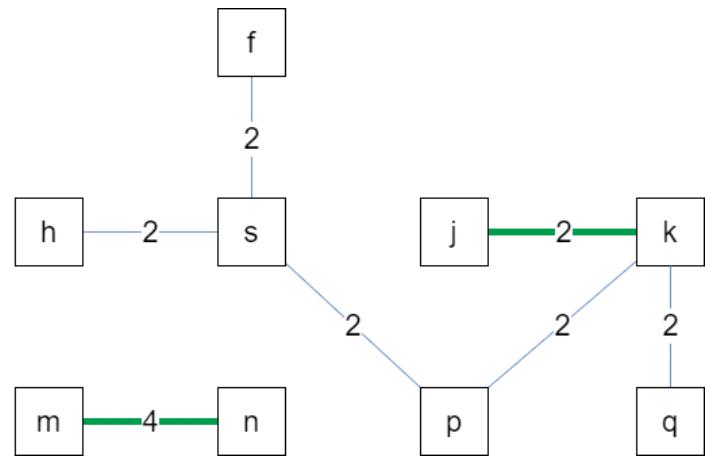
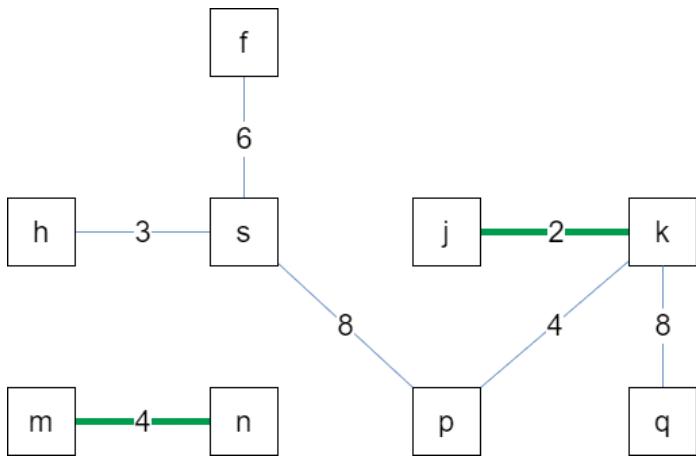
MAXIMUM SPANNING TREE

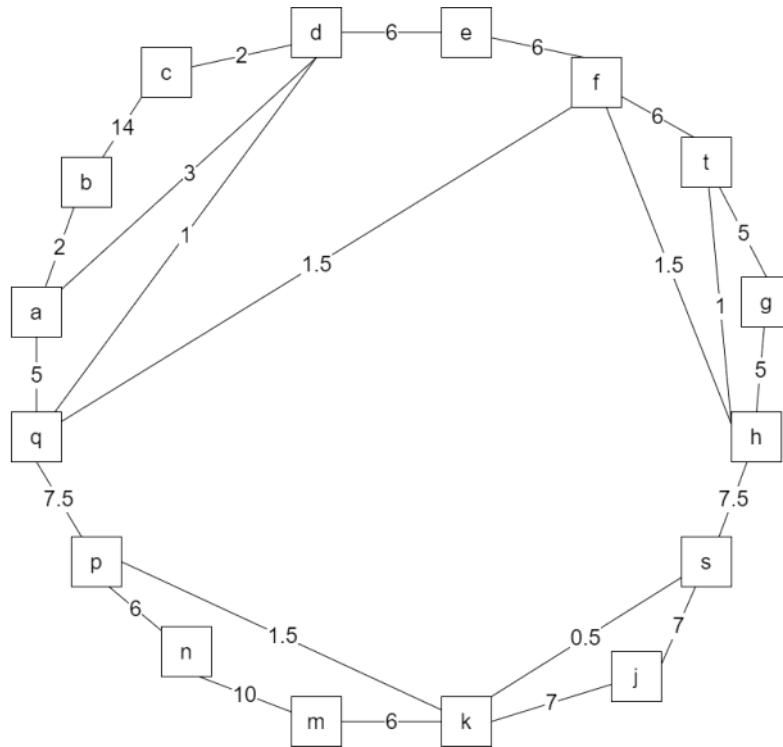
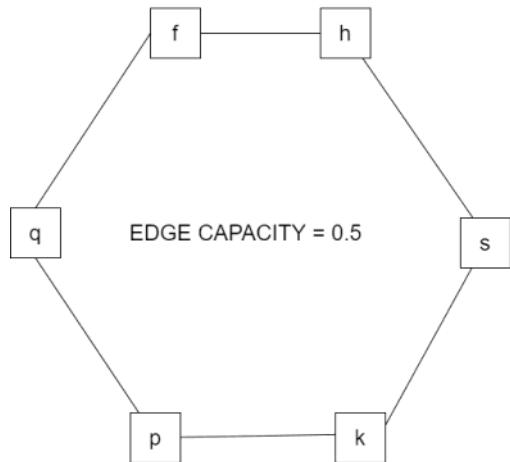
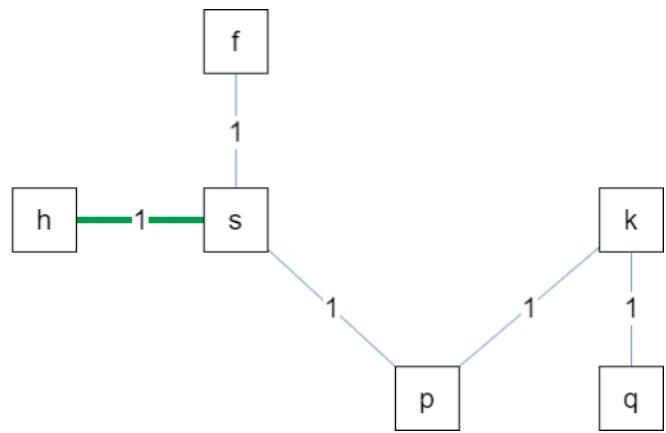
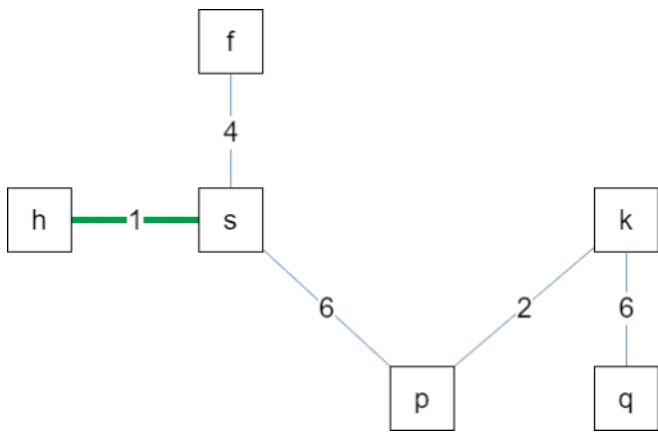


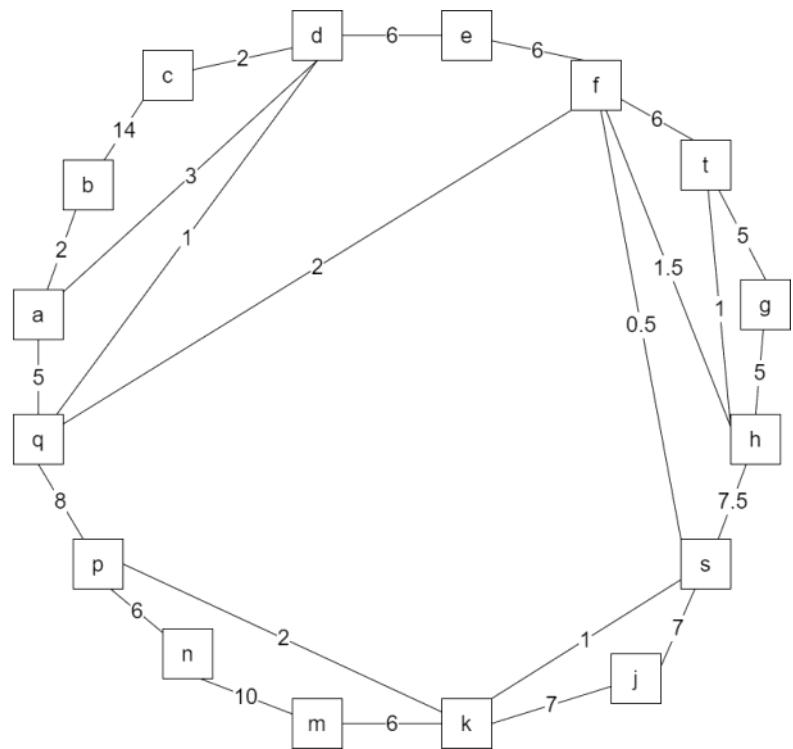
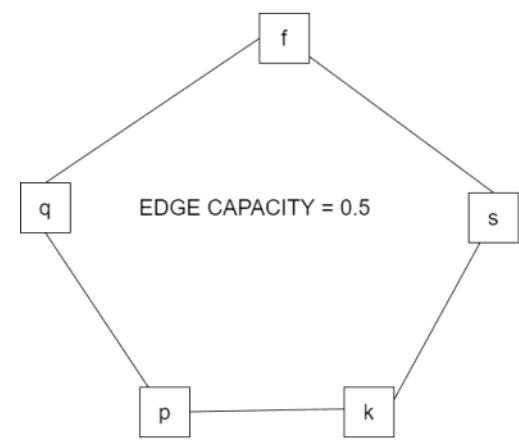
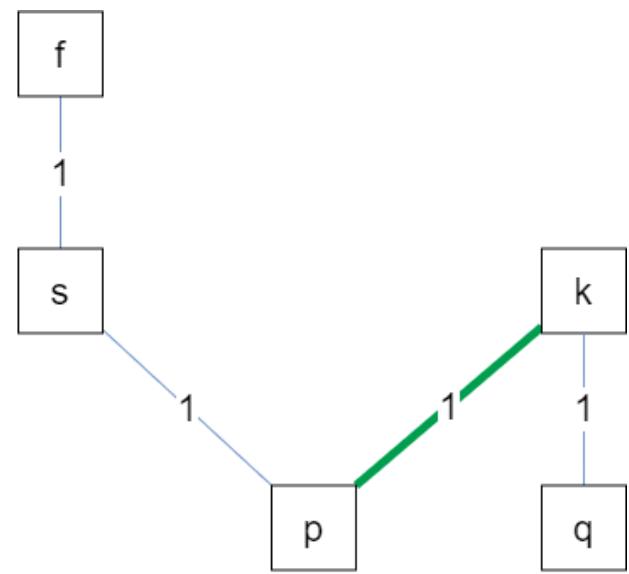
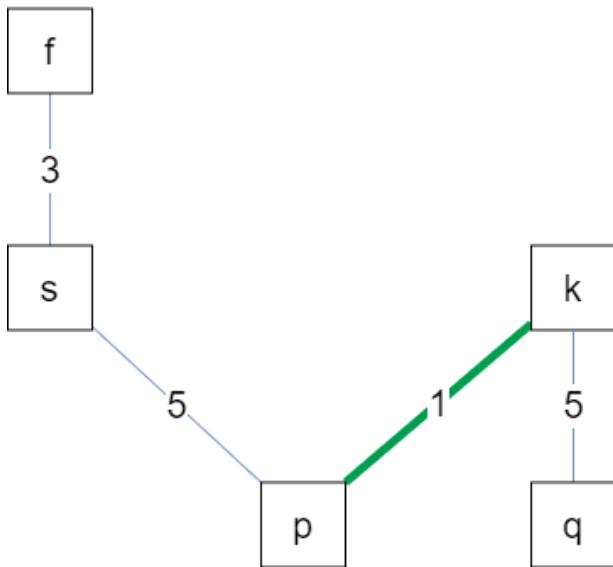


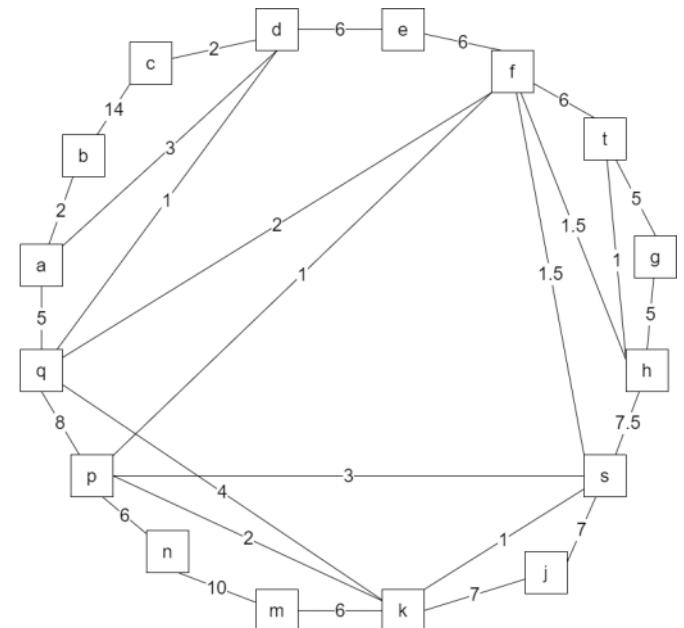
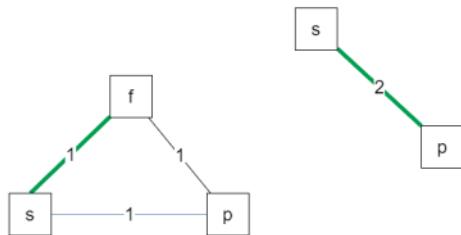
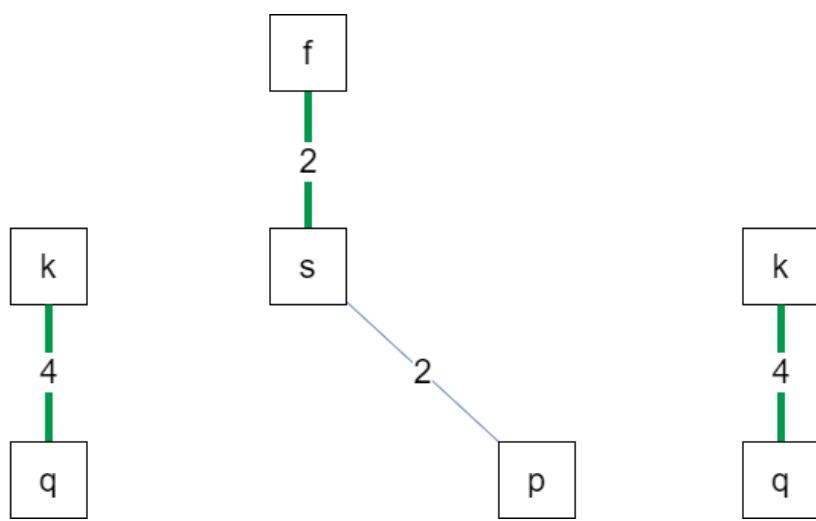
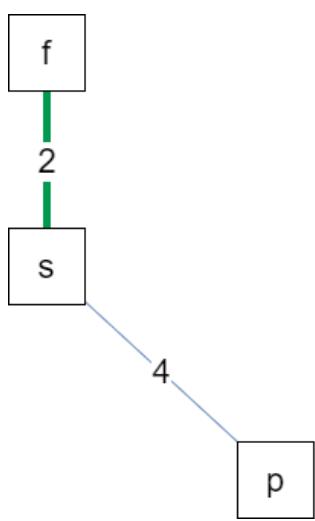




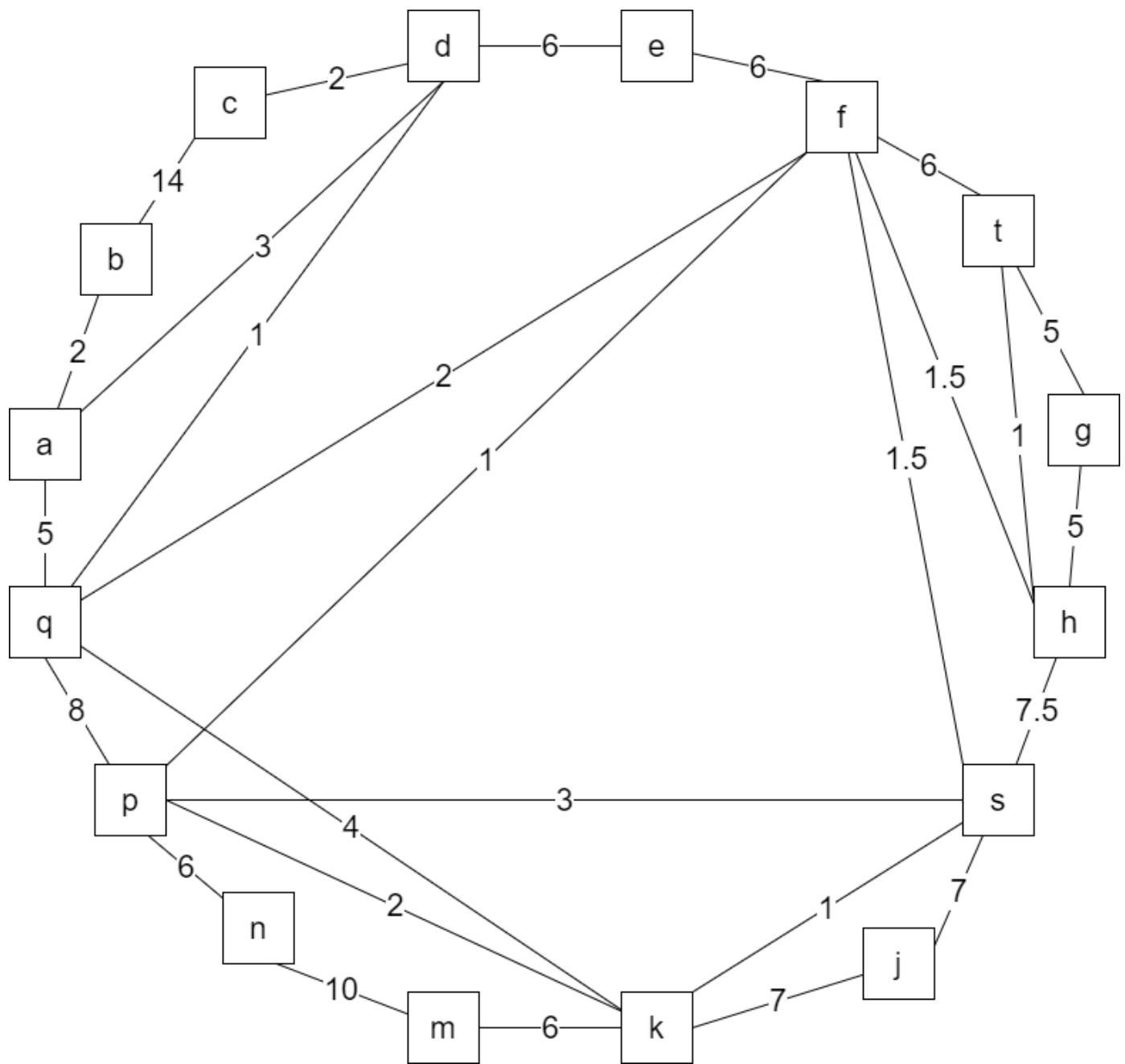




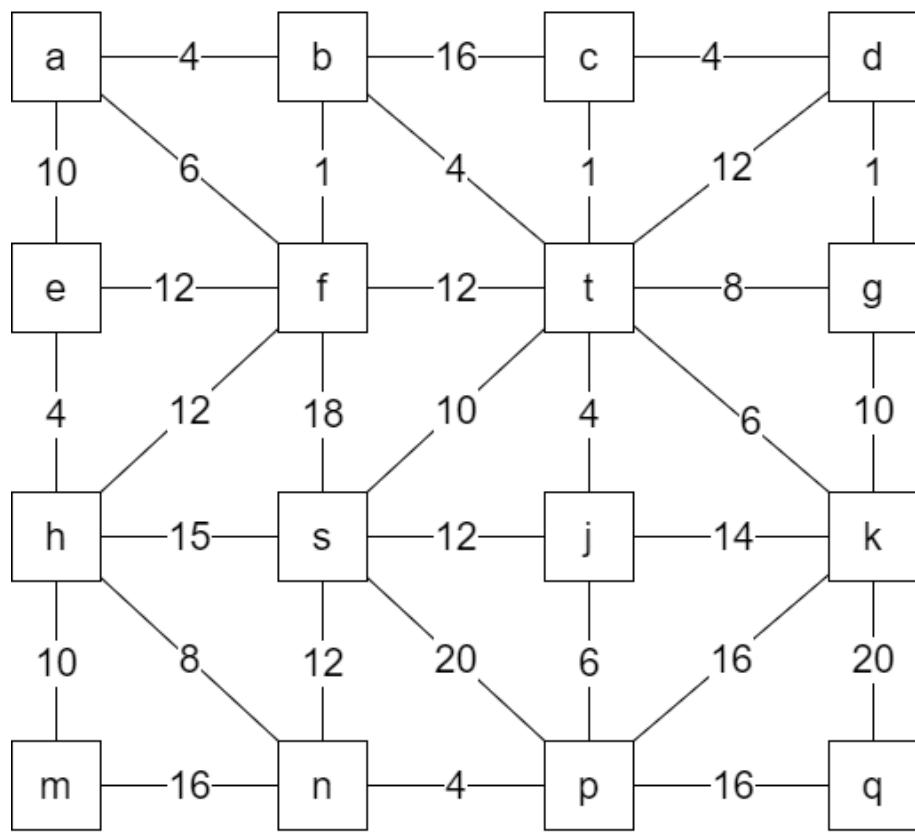




FINAL CIRCUIT

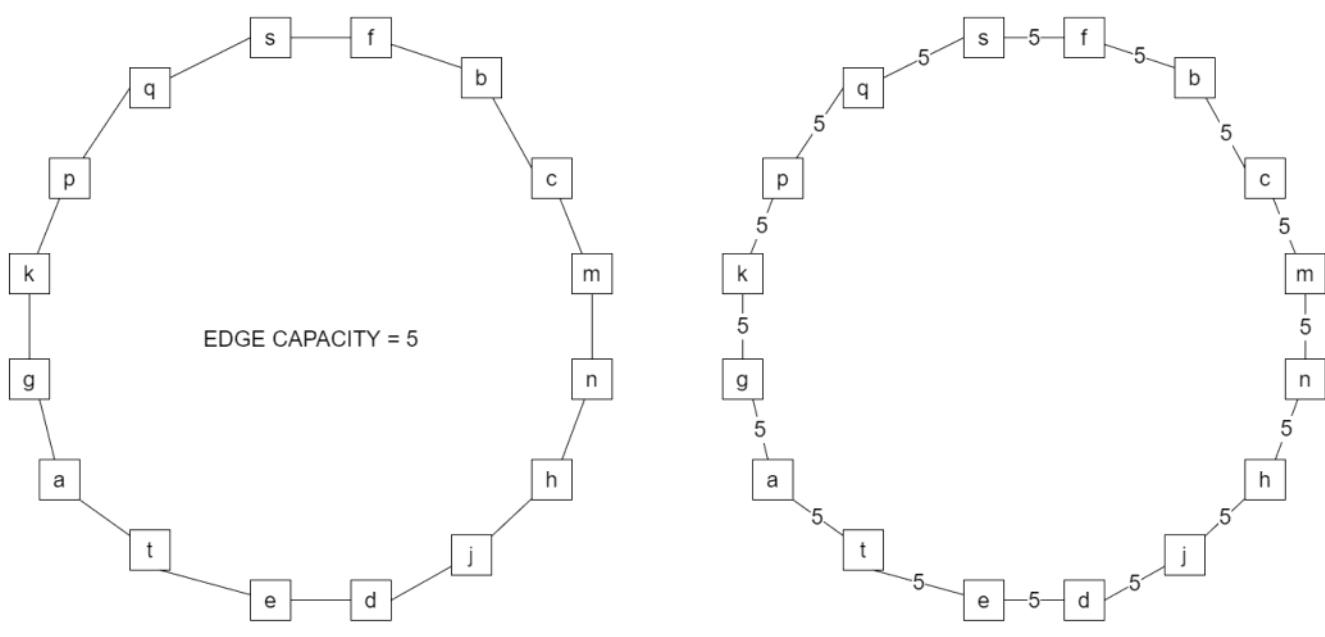


## SYNTHESIS ALGORITHM -2

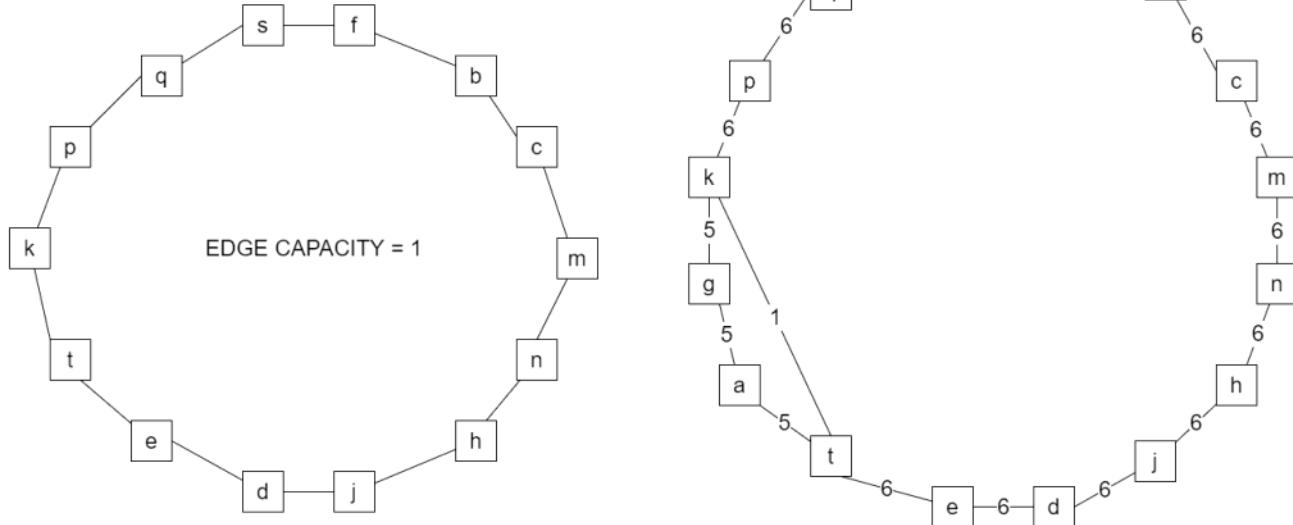


|   |    |
|---|----|
| a | 10 |
| b | 16 |
| c | 16 |
| d | 12 |
| e | 12 |
| f | 18 |
| t | 12 |
| g | 10 |
| h | 15 |
| s | 20 |
| j | 14 |
| k | 20 |
| m | 16 |
| n | 16 |
| p | 20 |
| q | 20 |

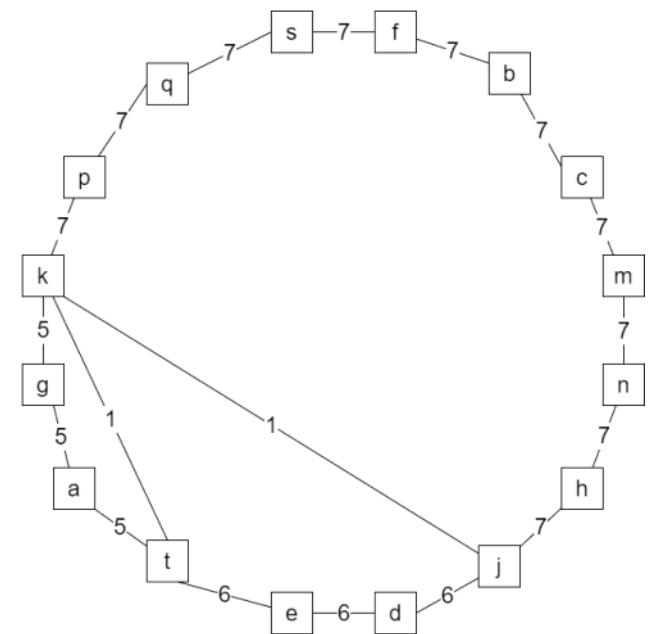
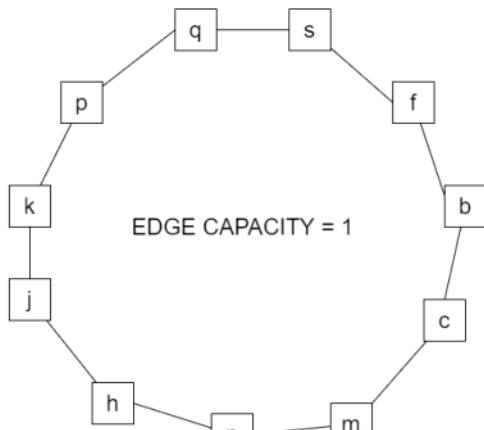
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|---|----|
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| p | 20 |
| q | 20 |
| s | 20 |
| f | 18 |
| b | 16 |
| c | 16 |
| m | 16 |
| n | 16 |
| h | 15 |
| j | 14 |
| d | 12 |
| e | 12 |
| t | 12 |
| a | 10 |
| g | 10 |



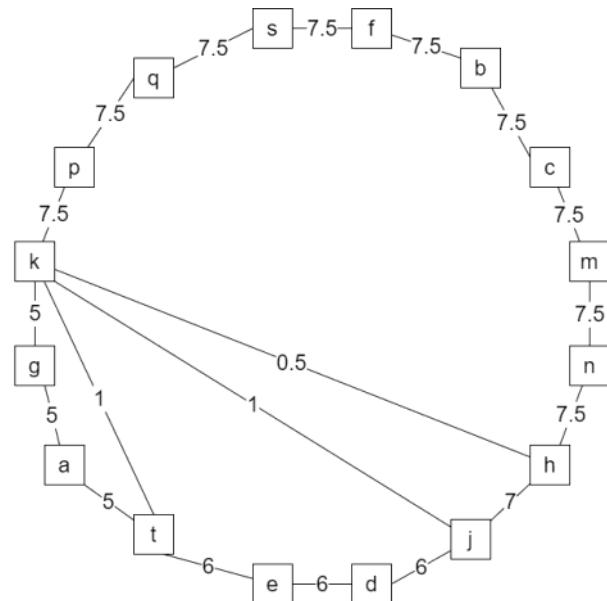
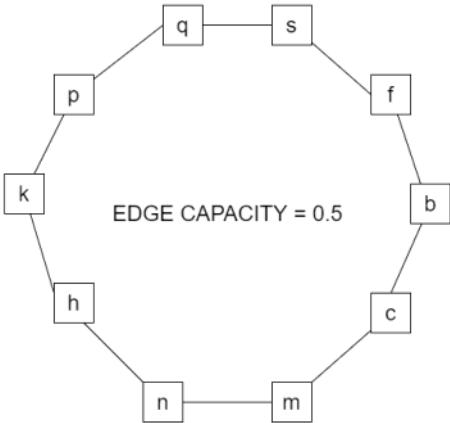
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|---|----|
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| p | 10 |
| q | 10 |
| s | 10 |
| f | 8  |
| b | 6  |
| c | 6  |
| m | 6  |
| n | 6  |
| h | 5  |
| j | 4  |
| d | 2  |
| e | 2  |
| t | 2  |
| a | 0  |
| g | 0  |



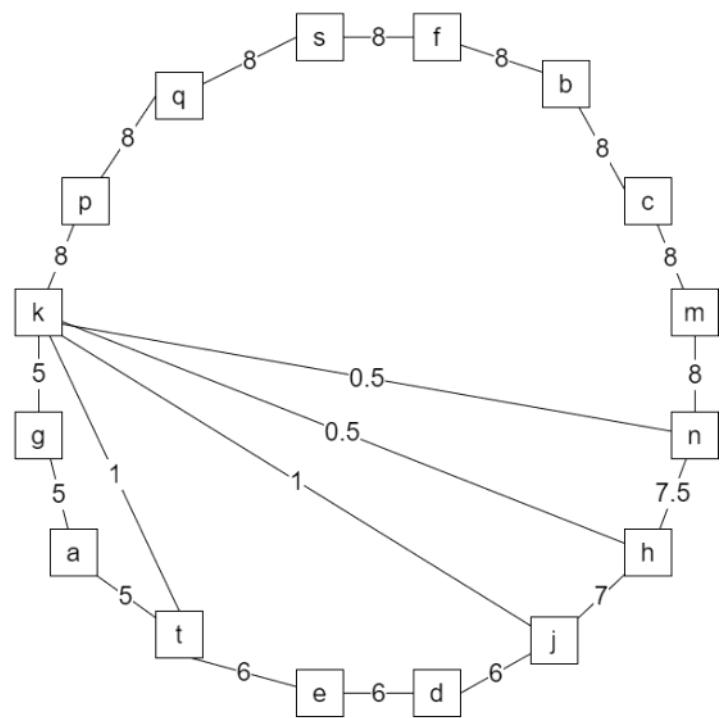
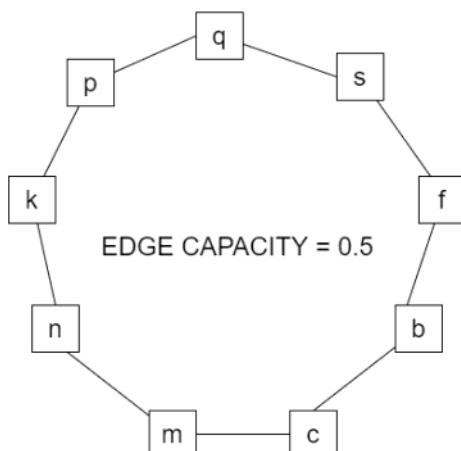
|   |   |
|---|---|
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| q | 8 |
| s | 8 |
| f | 6 |
| b | 4 |
| c | 4 |
| m | 4 |
| n | 4 |
| h | 3 |
| j | 2 |
| d | 0 |
| e | 0 |
| t | 0 |
| a | 0 |
| g | 0 |



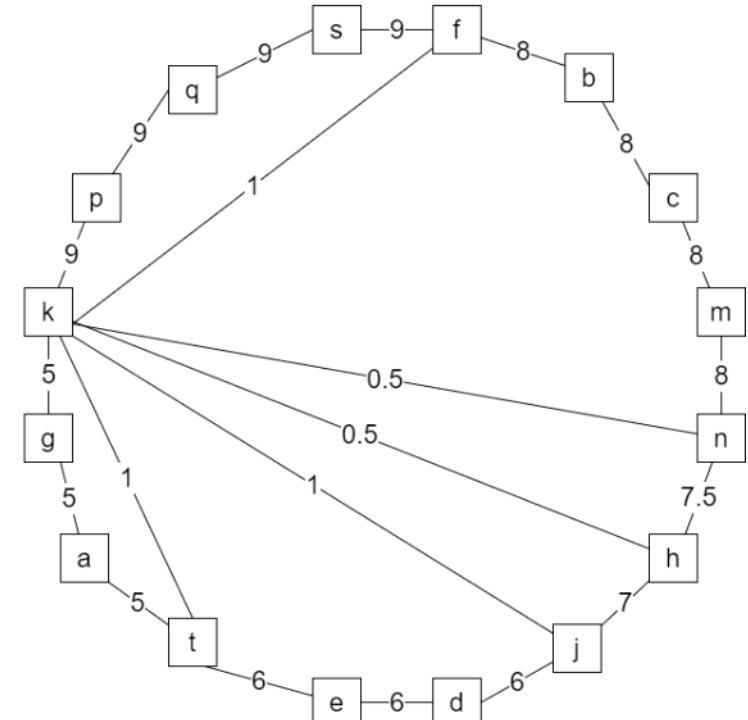
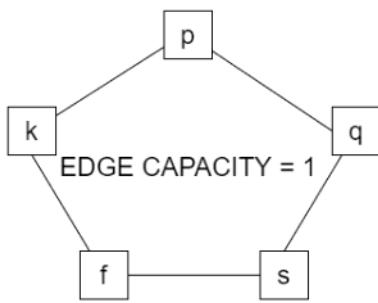
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| s | 6 |
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| m | 2 |
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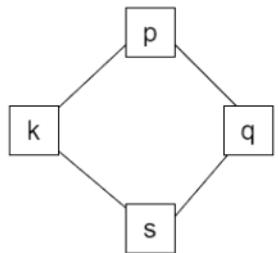
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| m | 1 |
| n | 1 |
| h | 0 |
| j | 0 |
| d | 0 |
| e | 0 |
| t | 0 |
| a | 0 |
| g | 0 |



|   |   |
|---|---|
| k | 4 |
| p | 4 |
| q | 4 |
| s | 4 |
| f | 2 |
| b | 0 |
| c | 0 |
| m | 0 |
| n | 0 |
| h | 0 |
| j | 0 |
| d | 0 |
| e | 0 |
| t | 0 |
| a | 0 |
| g | 0 |



|   |   |
|---|---|
| k | 2 |
| p | 2 |
| q | 2 |
| s | 2 |
| f | 0 |
| b | 0 |
| c | 0 |
| m | 0 |
| n | 0 |
| h | 0 |
| j | 0 |
| d | 0 |
| e | 0 |
| t | 0 |
| a | 0 |
| g | 0 |



EDGE CAPACITY = 1

