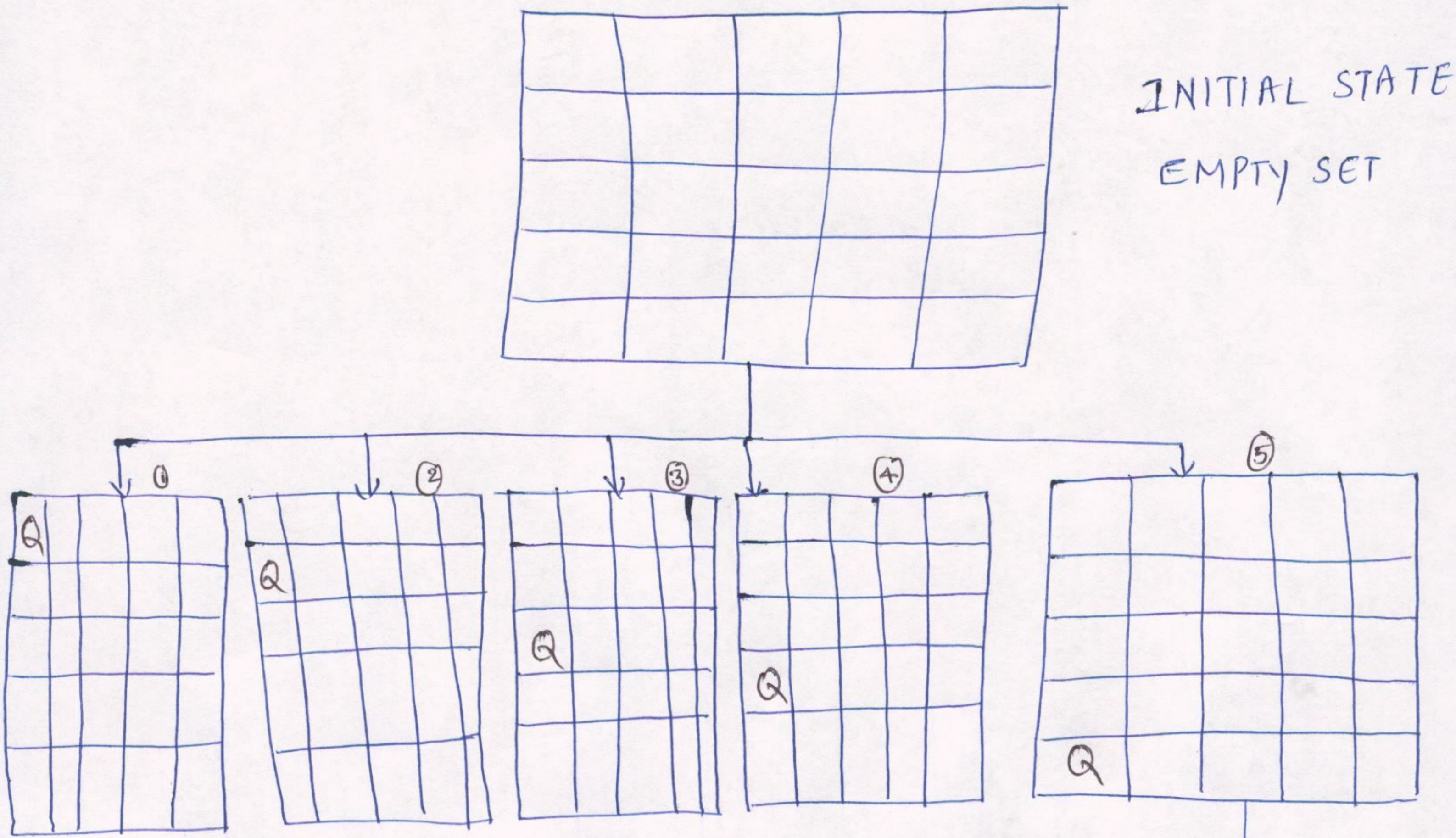
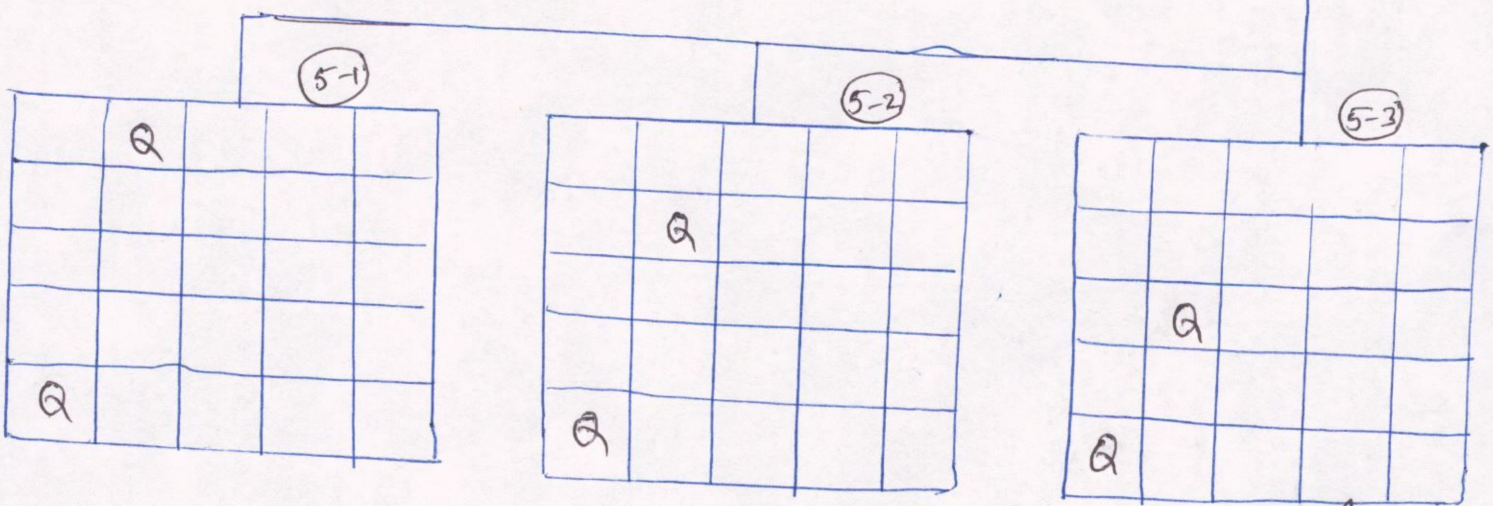
1. 5 QUEEN PROBLEM



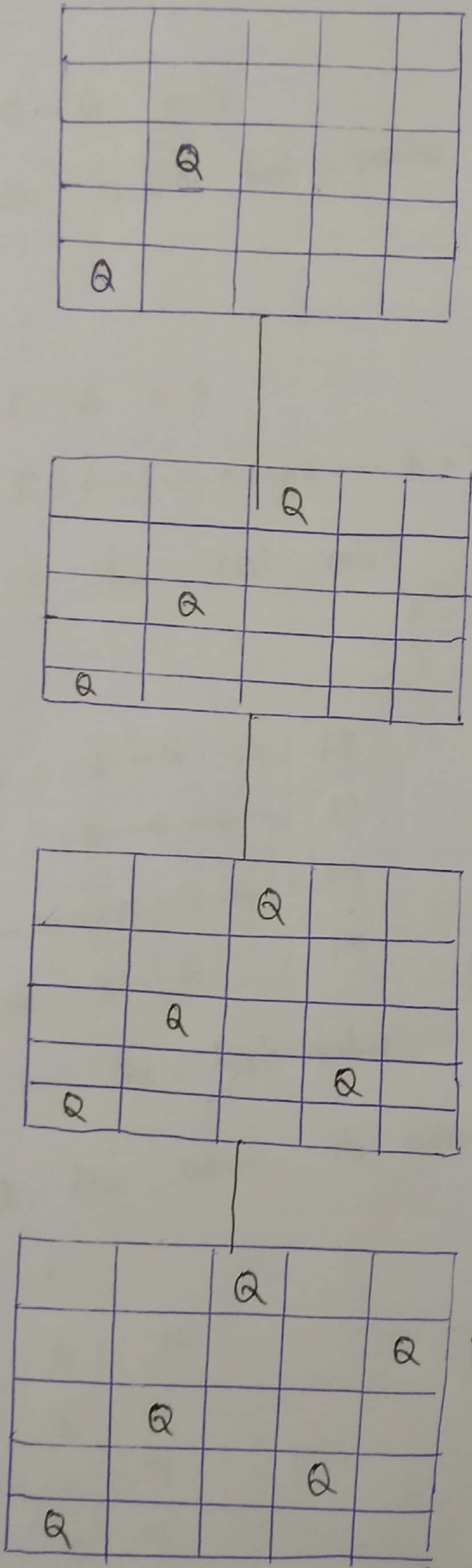
POP THE LAST NODE 5
AND EXPAND IT



↑ Lets expand this node.

Now, we have three possible states.

Queue: 1 2 3 4 ~~5~~ 5-1 5-2 5-3 ← pop



5-3 Continuing the same state from the above page

5-3-1

Only one state possible if we place the queen in any other grid it will be attacked

5-3-1-1

5-3-1-1-1

5- QUEEN PROBLEM SOLVED

GOAL STATE

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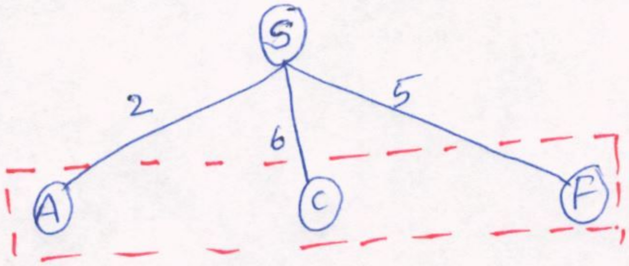
2. BREADTH-FIRST TREE SEARCH

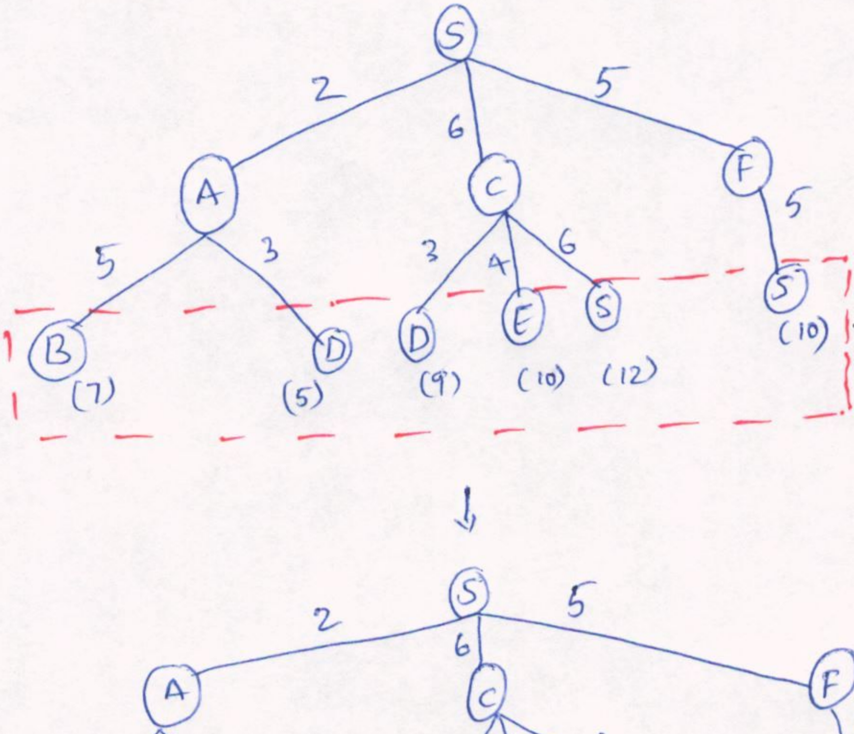
INITIAL STATE : S

GOAL STATE : G



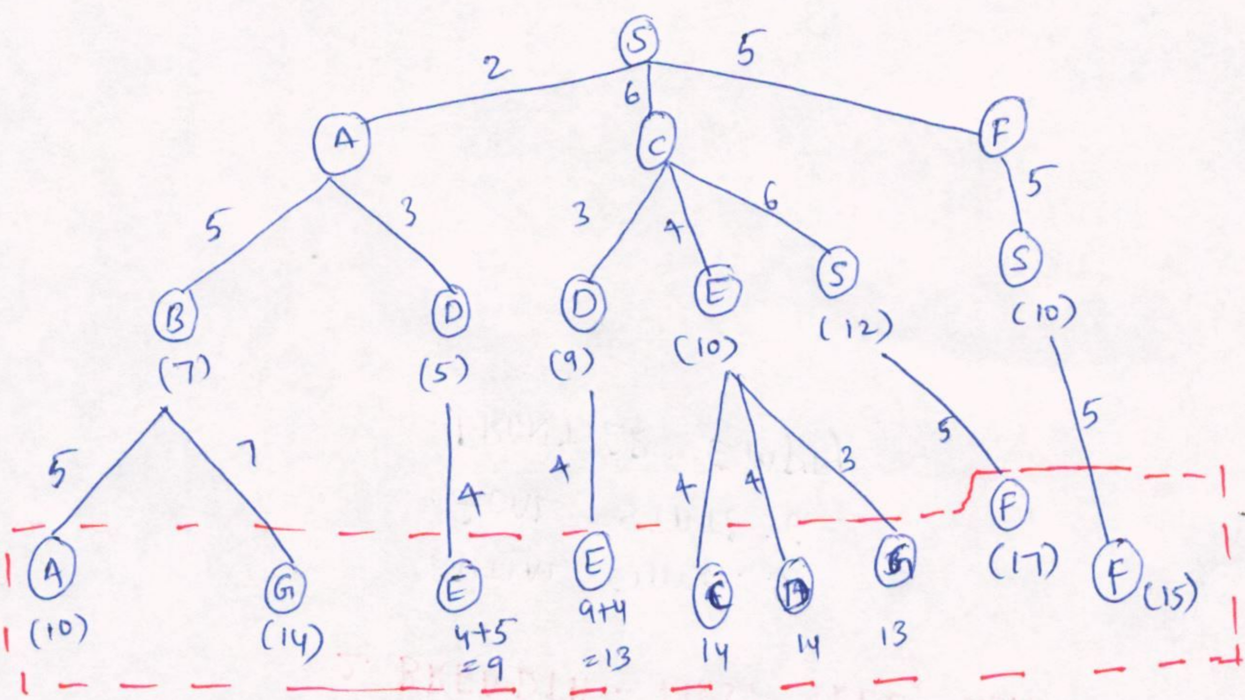
FRONTIER : A C F

Lets enpand these nodes.



FRONTIER

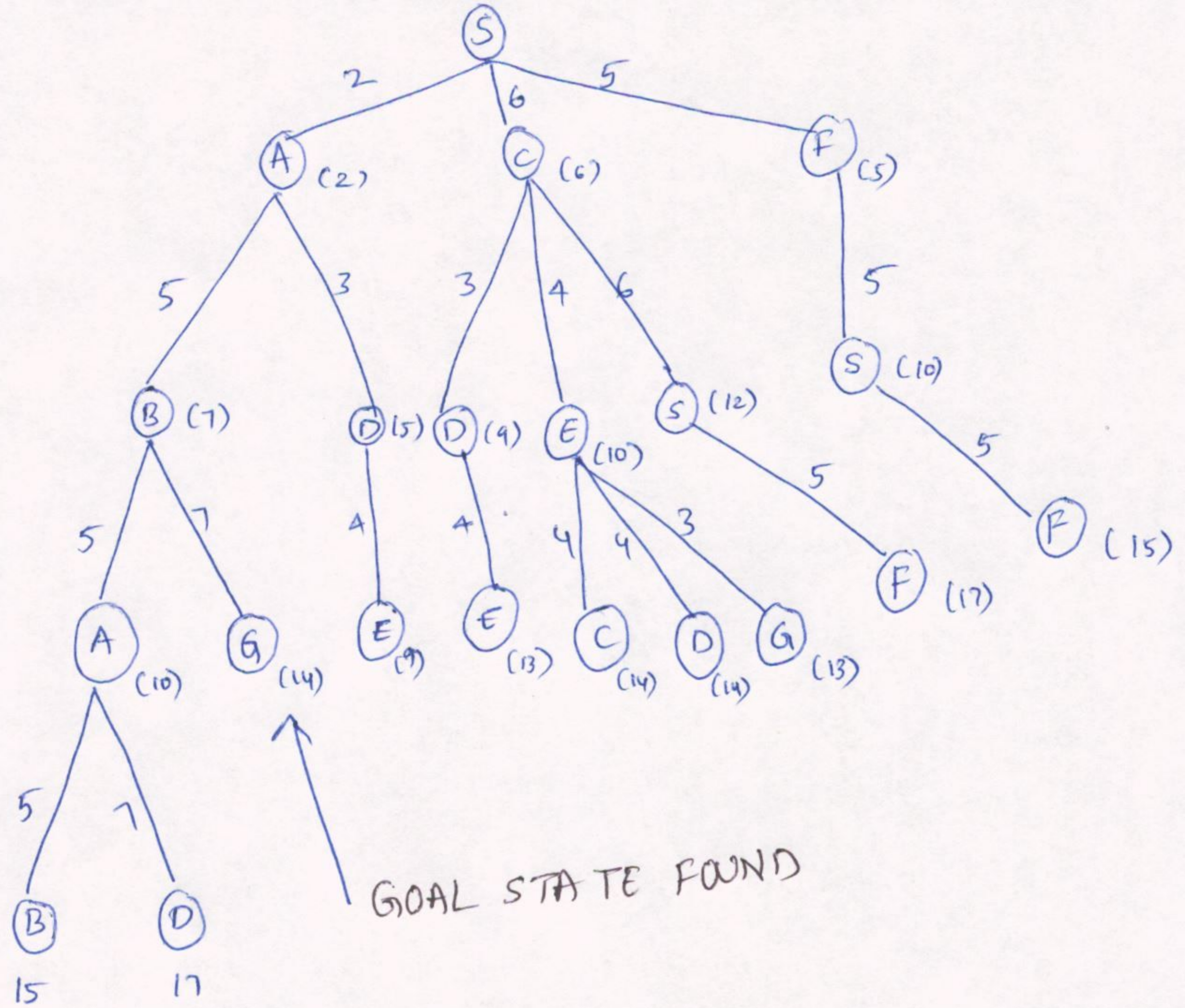
B D D E S S



FRONTIER

A G E E C D G

F F



PATH ⇒ S-A-B-G

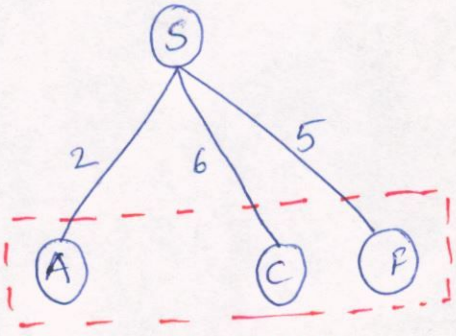
COST ⇒ 14

3. UNIFORM- COST GRAPH SEARCH

S: INITIAL STATE

G: GOAL STATE

Expand initial state

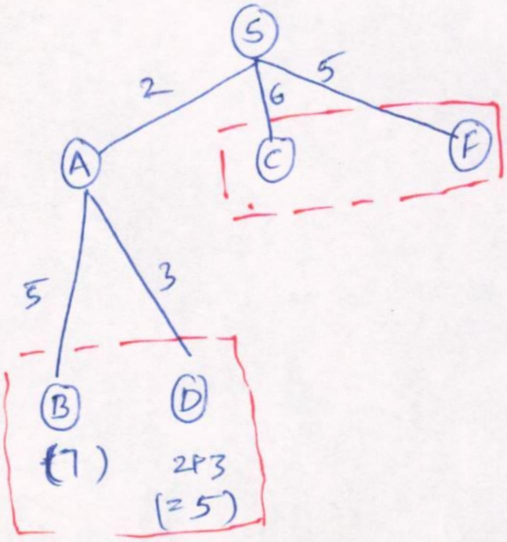


FRONTIER

EXPLORED SET (EX-SET) : S

$\Rightarrow$

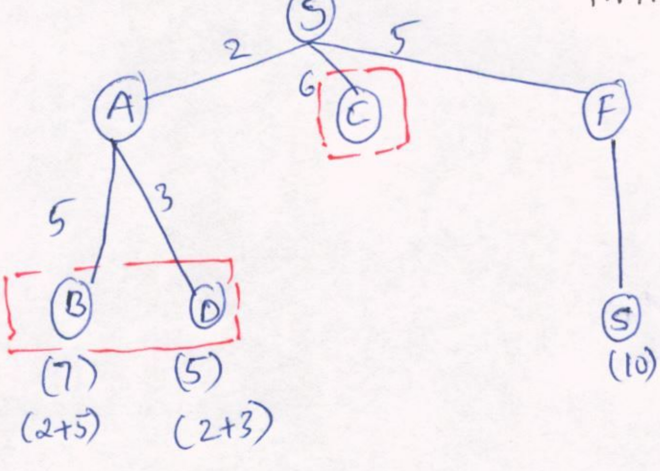
Expand A with minimum cost



EX-SET:

S A

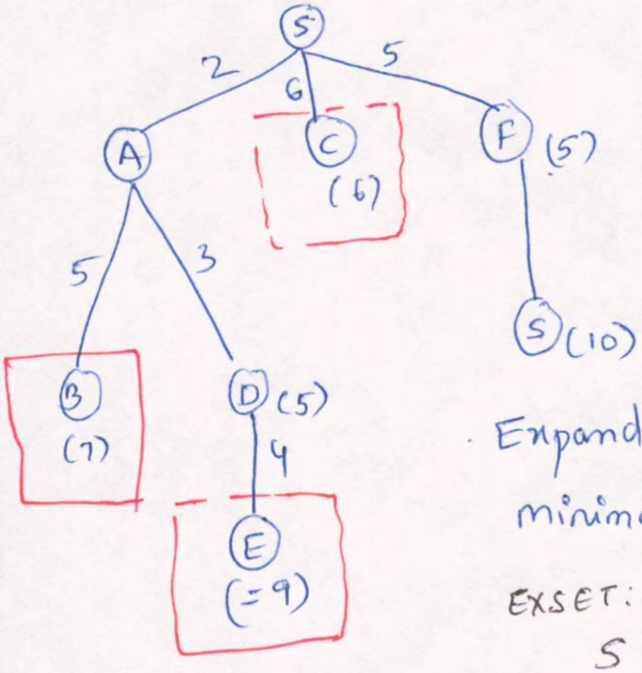
D and F are minimal nodes consider F since it entered frontier first



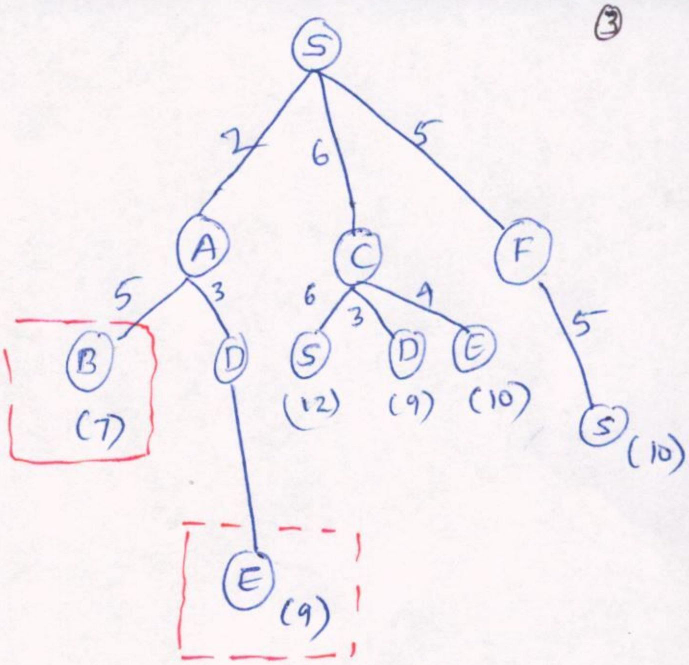
Lets not take S into frontier since it is already explored

EX-SET : S A F

→ Expand D with minimum cost



⇒



Expand C with minimal cost 6

EXSET:

S A F D

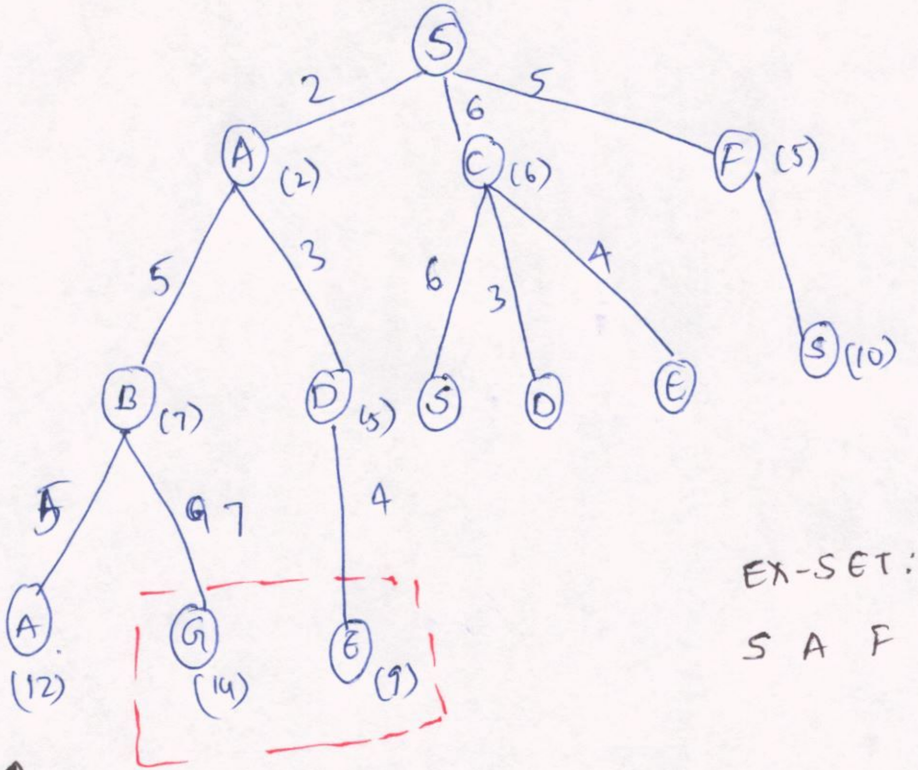
⇓

Expanding B

EX-SET:

S A F D C

Since D, E, S are already explored, lets not add them into frontier



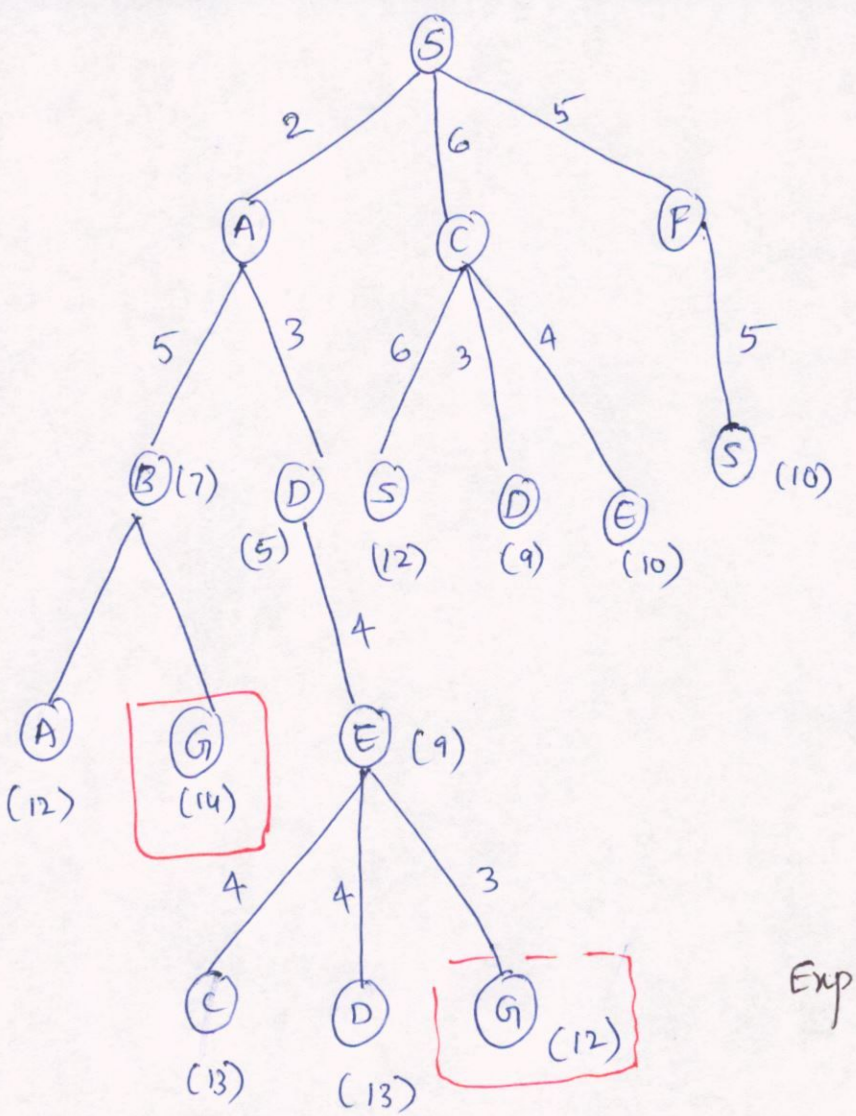
EX-SET:

S A F D C B

↑

A is already explored

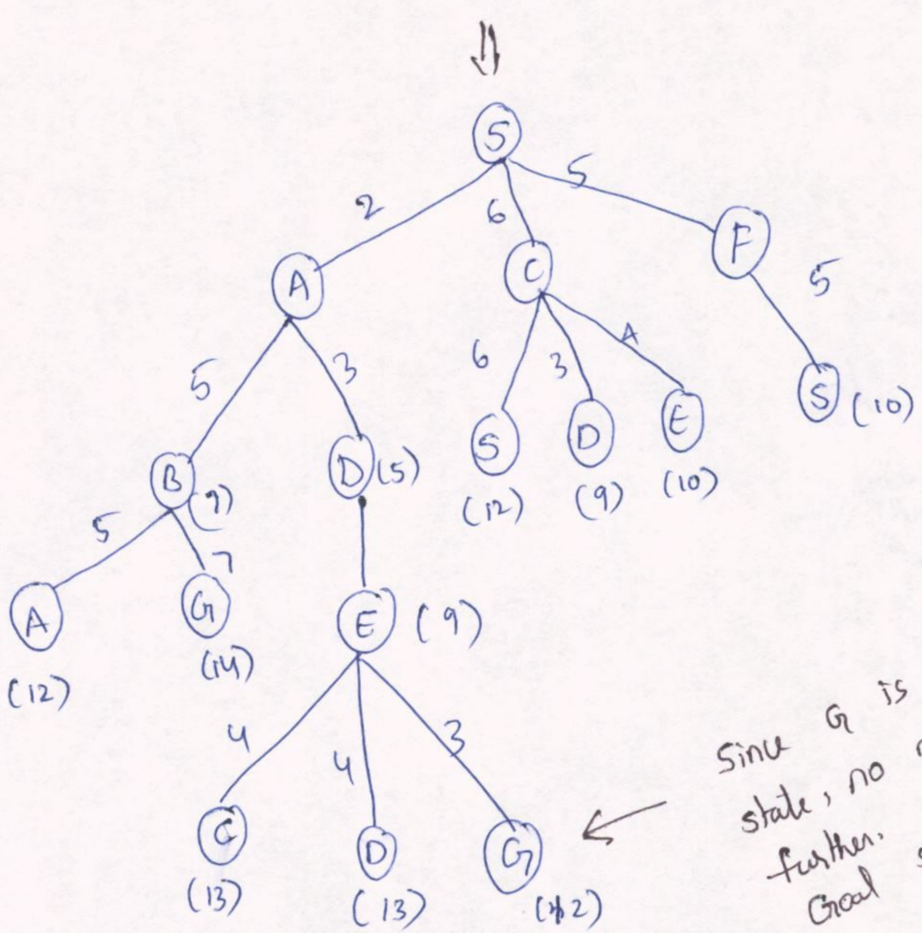
Expand E



EX-SET
S A F D C B E

Expand G with min cost
12

⇓



PATH:
S — A — D — E — G

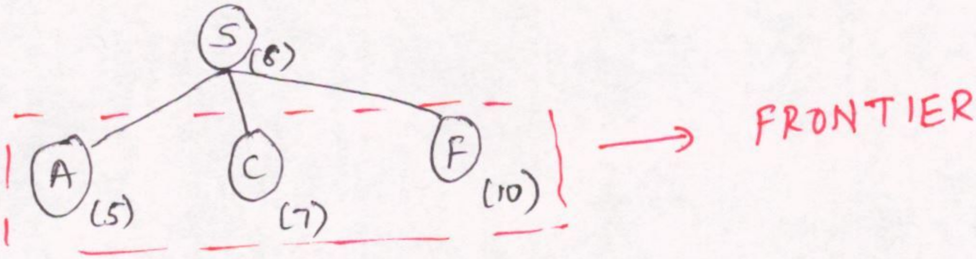
COST: 12

Since G is the goal state, no need to expand further. Goal state reached.

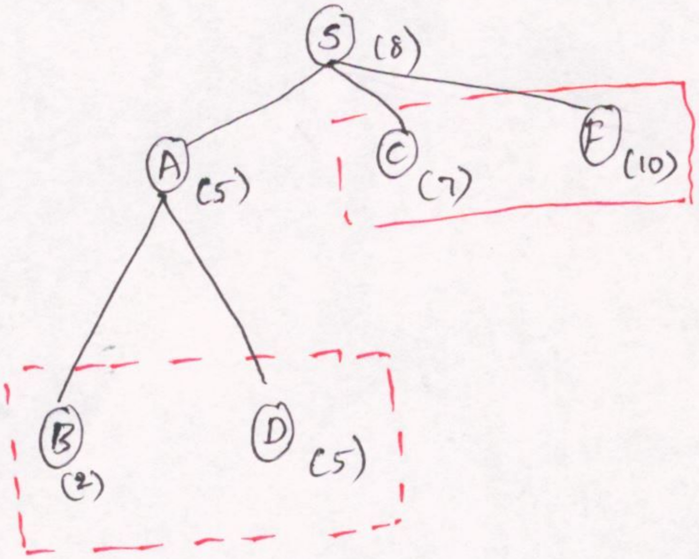
4. Greedy best-first search

S: INITIAL STATE

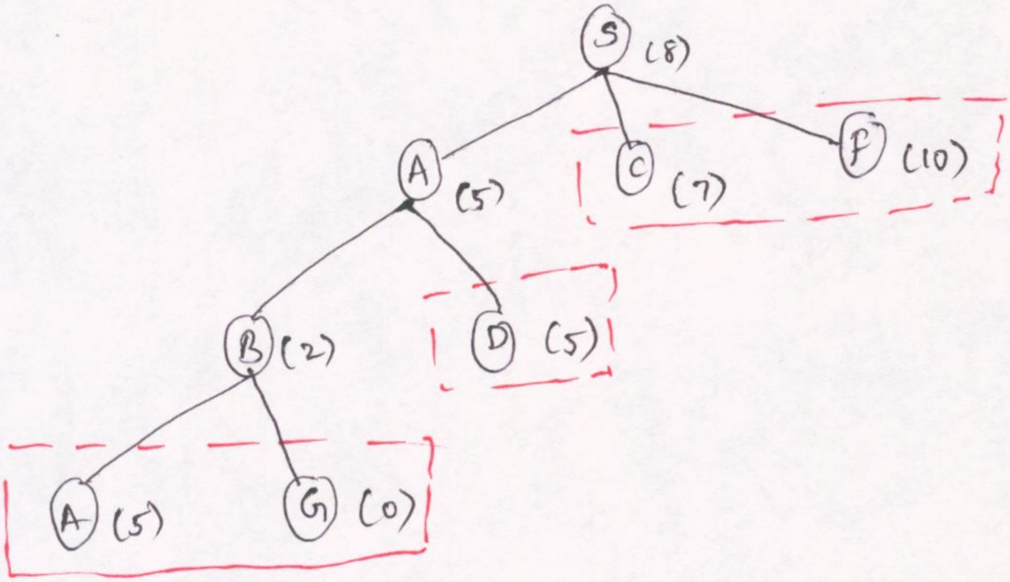
G: GOAL STATE



EXPAND A WITH MIN h(n)



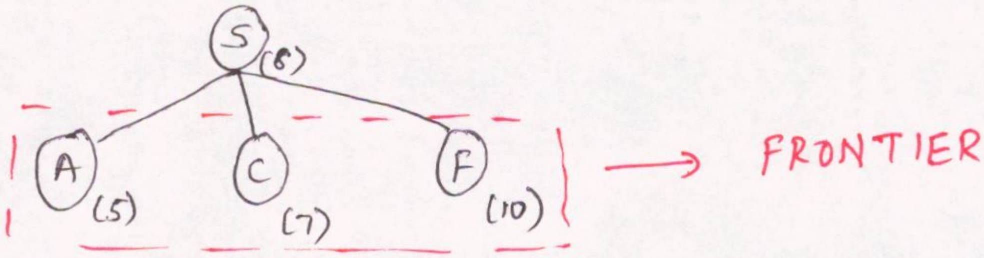
Expand B with best h(n) value



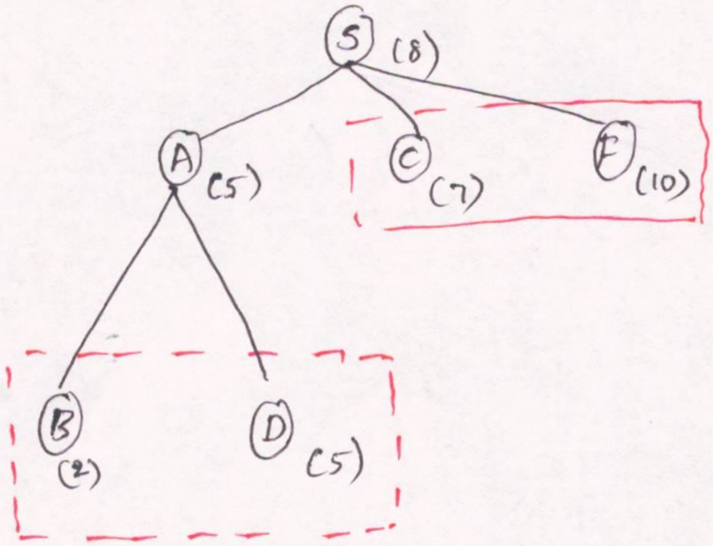
4. Greedy best-first search

S: INITIAL STATE

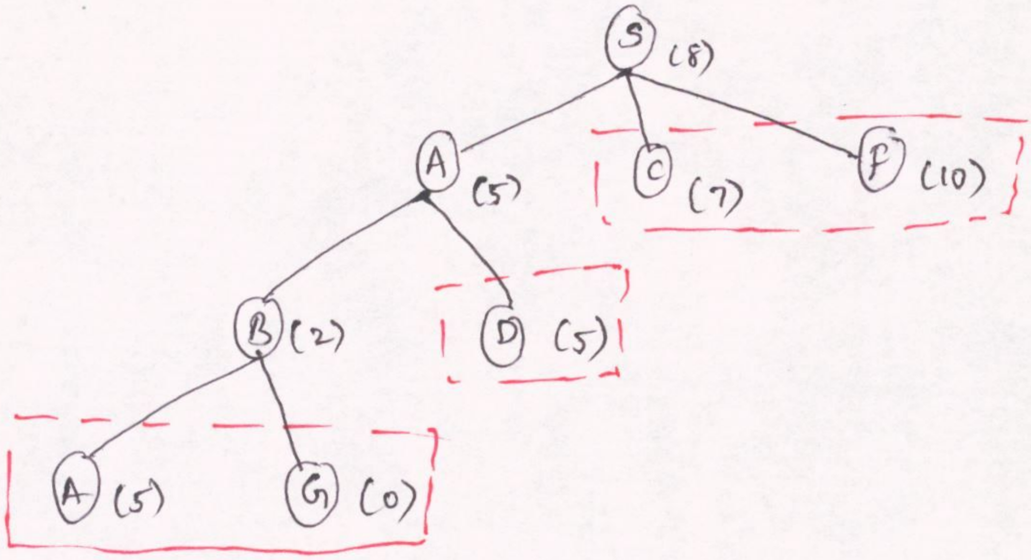
G: GOAL STATE

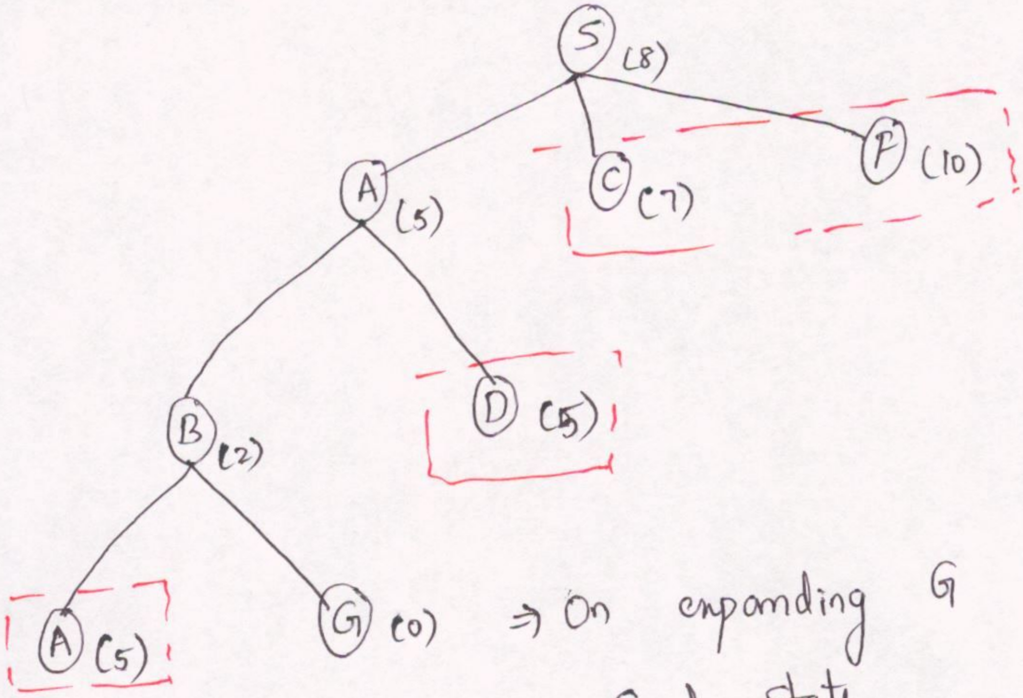


$\Downarrow$ EXPAND A WITH MIN $h(n)$



$\Downarrow$ Expand B with best $h(n)$ value





⇒ On expanding G we can find it as Goal state

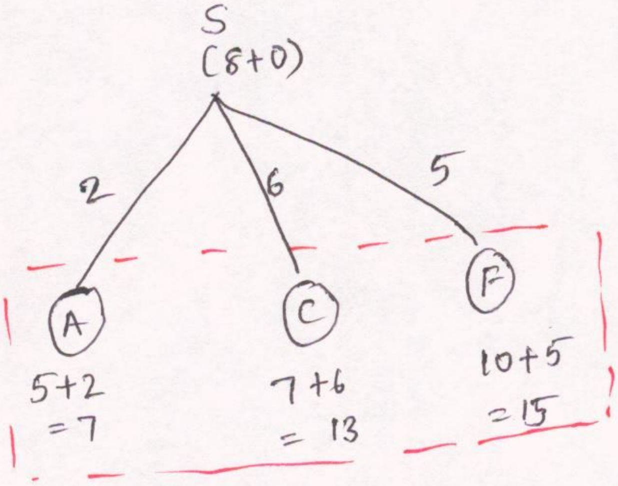
Path : S — A — B — G

Cost : 14

5. A* tree search

Initial state : S

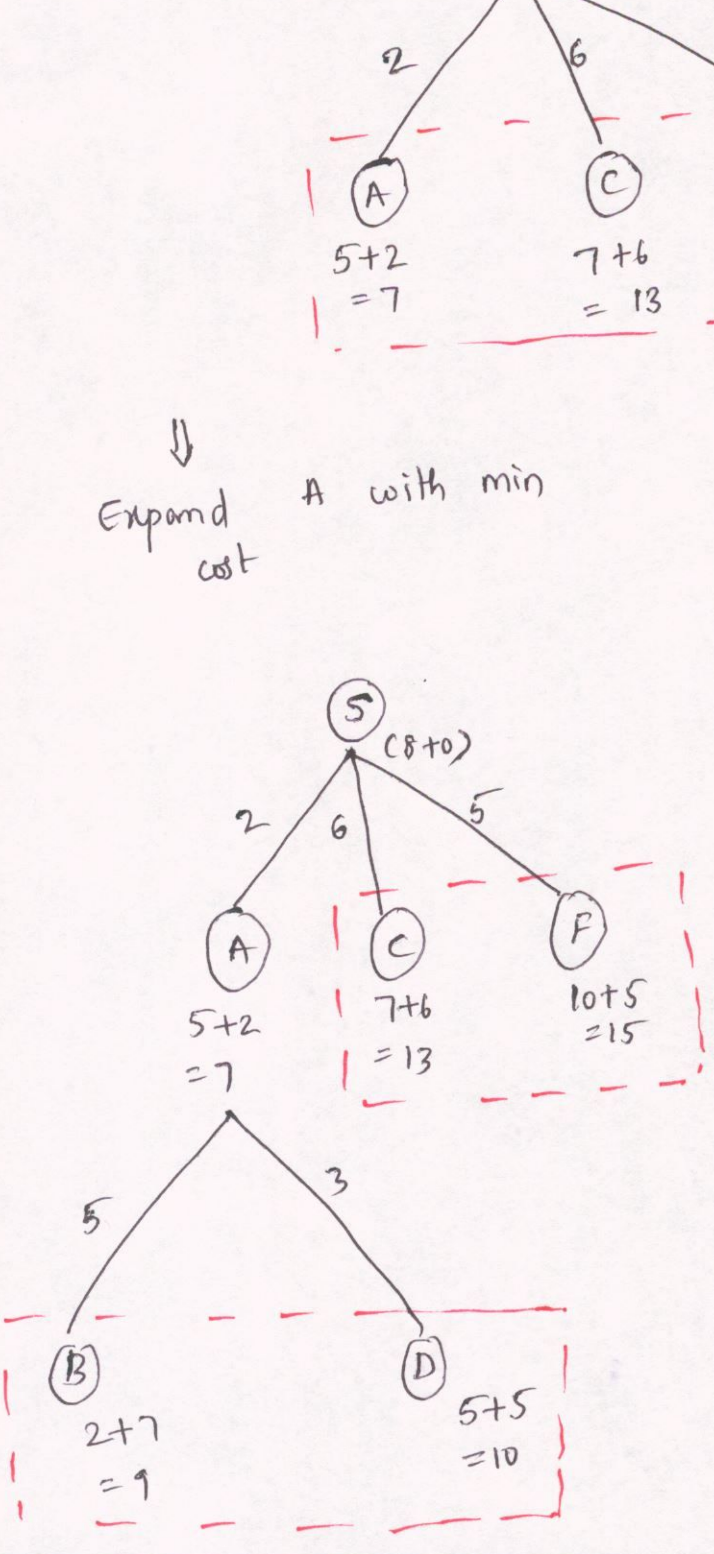
Goal state : G



→ FRONTIER

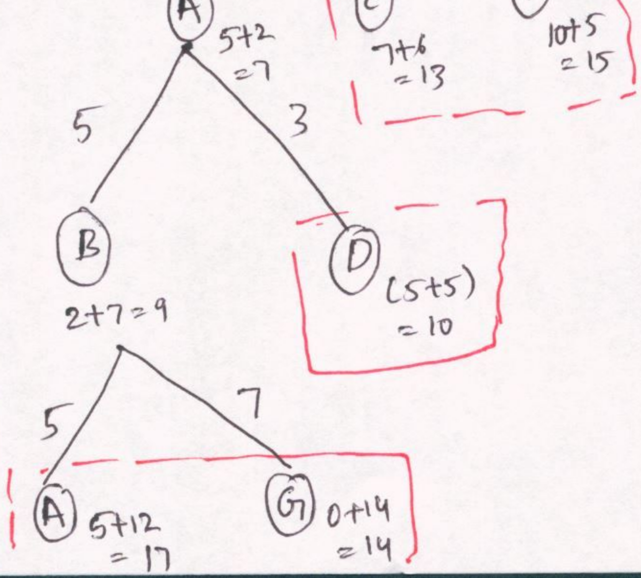
⇓

Expand A with min cost

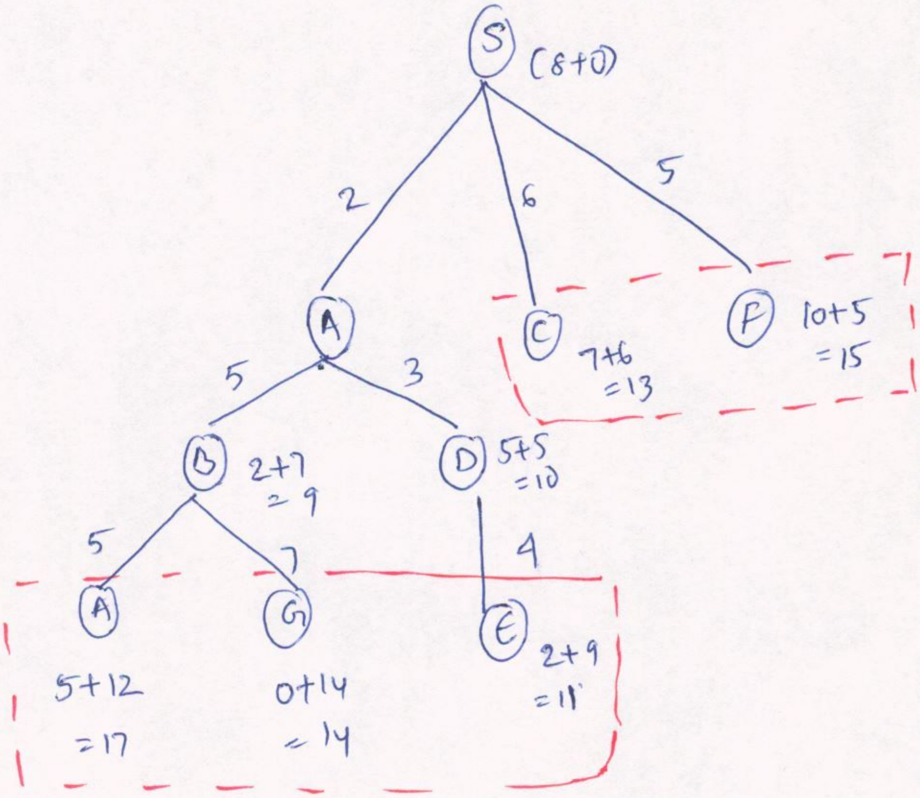


⇓

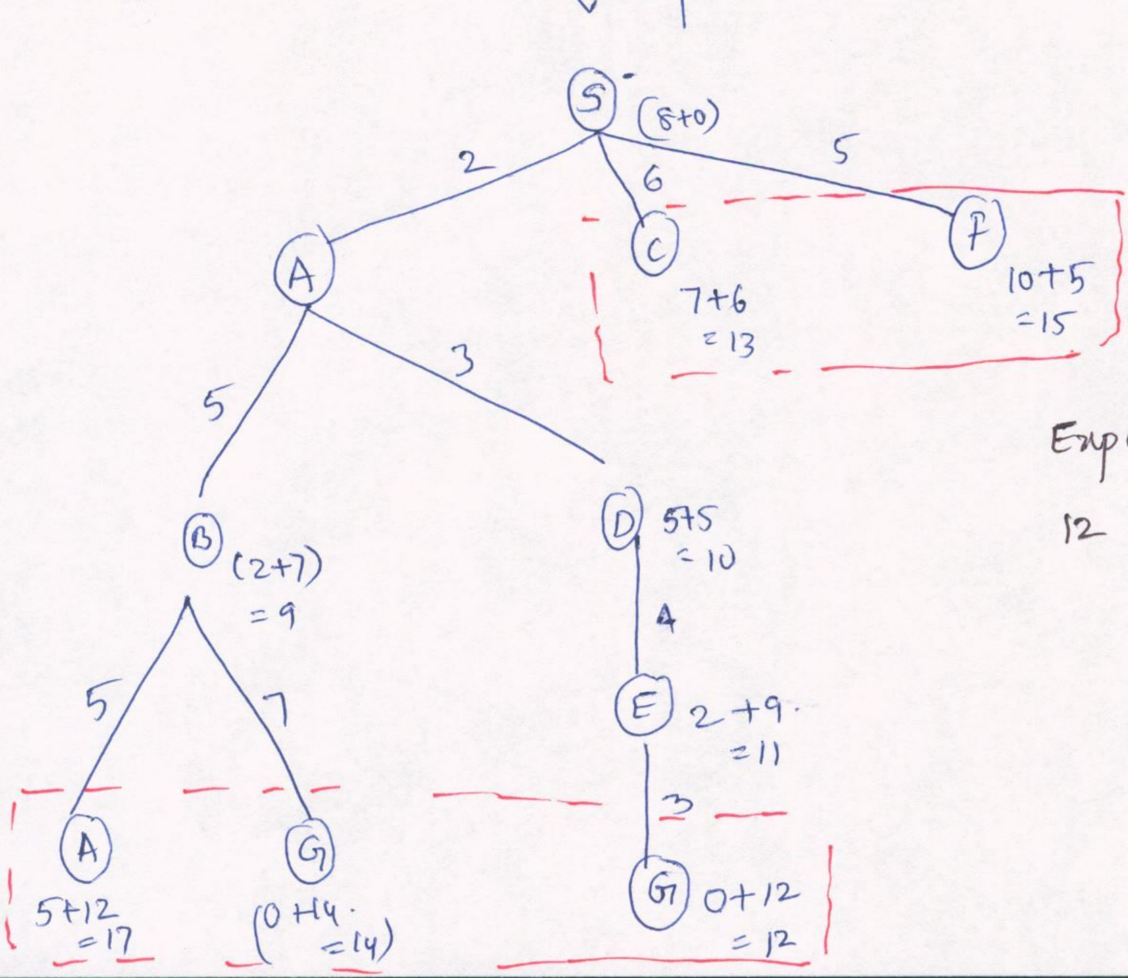
Expand B with min value



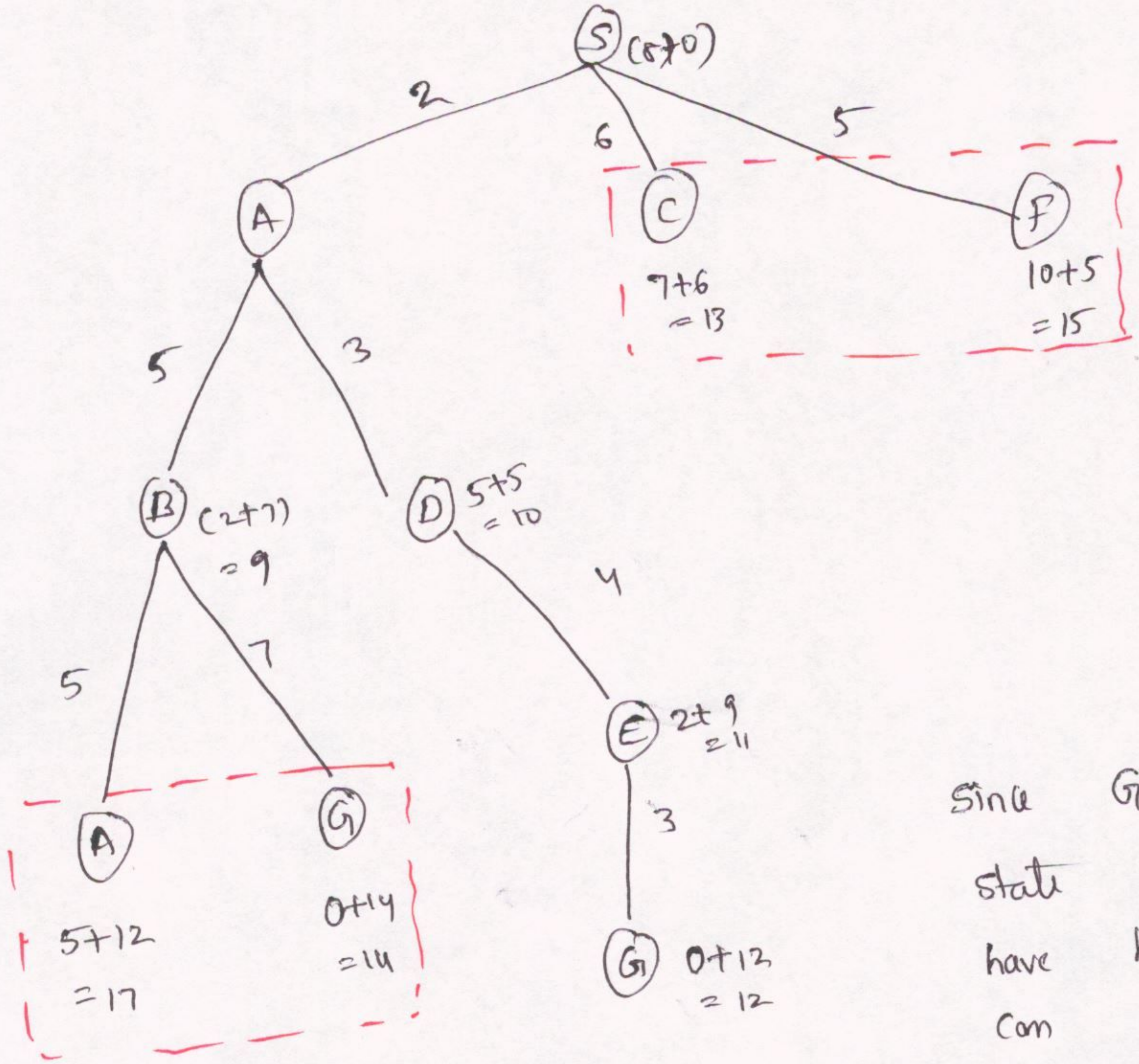
Expand D with min value



⇓ Expand E



Expand G with 12



Since G is the goal state and other states have higher cost. we can consider the path
. S – A – D – E – G as the minimal cost path

path: S – A – D — E — G

Cost : 12

6. Admissible heuristic function

I am considering the shortest path as best heuristic

h(G) = 0, since G is goal state.

h(A):

A – D – C – G = 10

A – B – G = 12

Considering 10, since it is the shortest path

h(B):

B – G = 7

B – A – D – E – G = 15

~~B – A – D – E~~.

7 is the shortest path here

h(C):

C – E – G = 7

C – D – E – G = 10

C – S – A – D – E – G = 18

C – S – A – B – G = 20

Hence, considering 7 as the best possible h(D) :

D – E – G = 7

consider 7 as best possible

h(E) :

E – G = 3

E – C – S – A → B – G = 24

3 is the best value

h(F) :

F – S – C – E – G = 18

F – S – C – D – E – G = 21

F – S – A → D – E – G = 17

F – S → A – B – G = 19

18 is the best value

h(S) :

S – A – D – E – G = 12

S – A – B – G = 14

S – C – D – E – G = 16

S – C – E – G = 13

12 is the best value

From all the above, the admissible heuristic function is

h:

A : 12

B : 7

C : 7

D : 7

E : 3

F : 18

G : 0

S : ~~a~~ 12

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