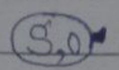
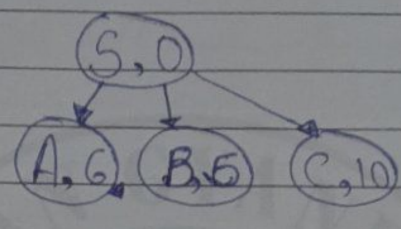
Assignment 1A

Q1.

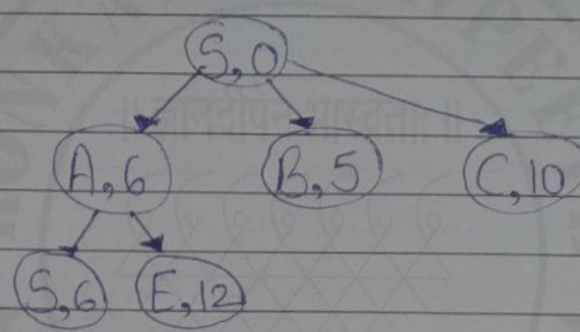
1.1] → Step 0:



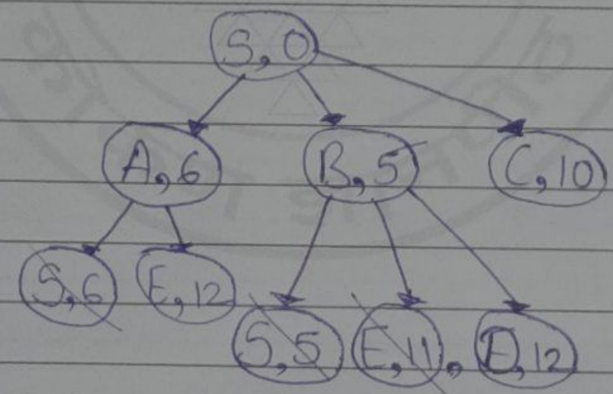
Step 1:



Step 2:



Step 3:



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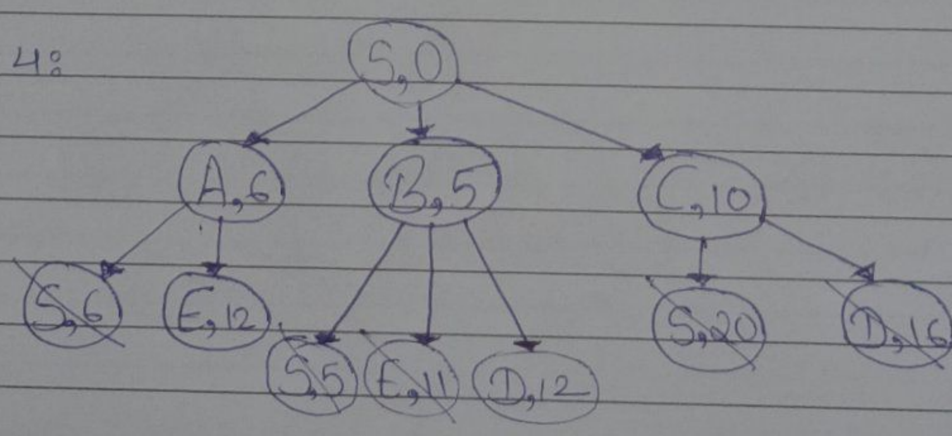
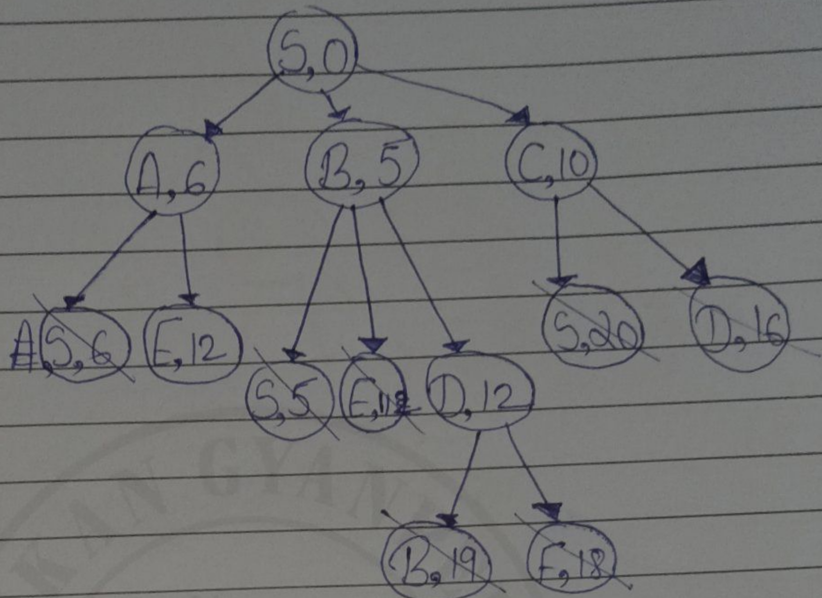


Step 5:



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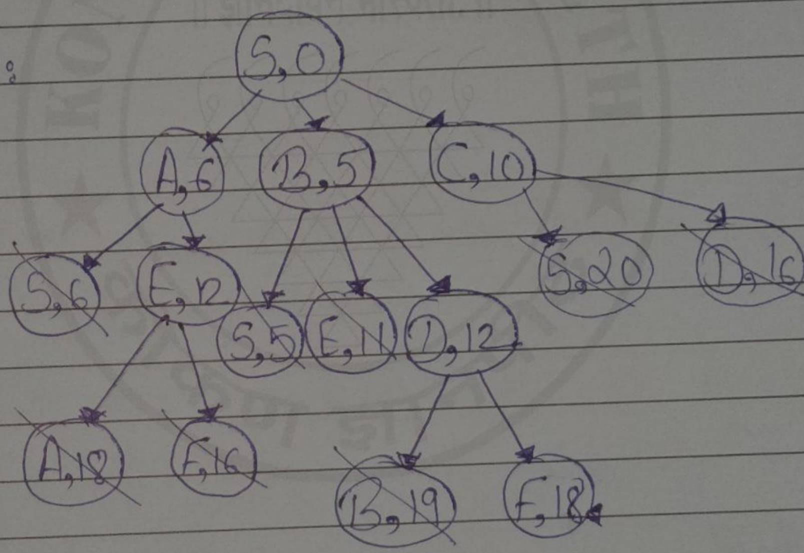
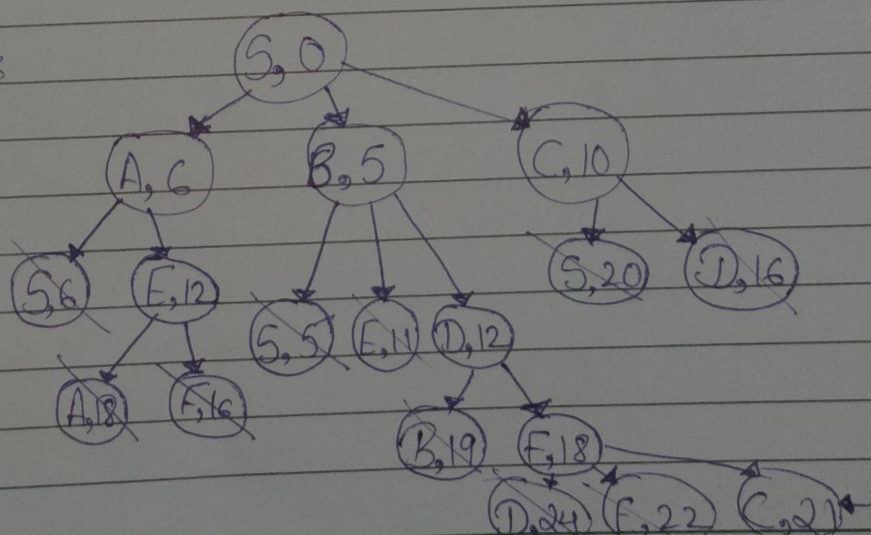
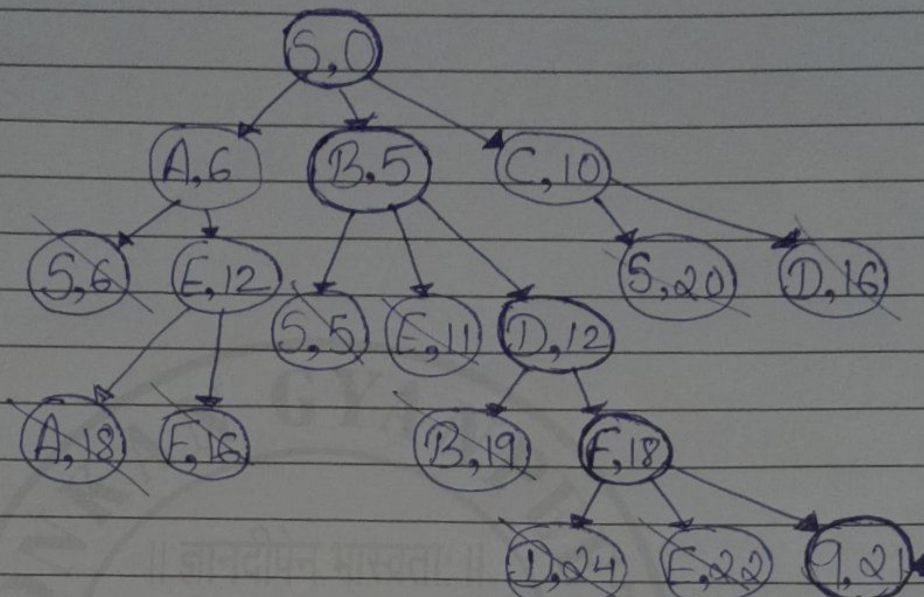


Step 7:



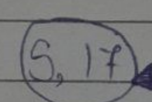
Step 8:



1.4

→ Initialization : Compute f-score for S & put in it the openlist.

F-Score S : $f(S) = h(S) = 17$



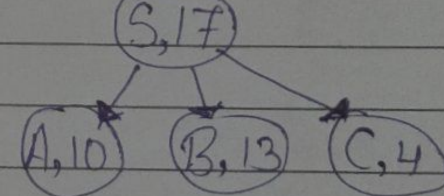
Step 1:

F-Score of successors

$f(A) = h(A) = 10$

$f(B) = h(B) = 13$

$f(C) = h(C) = 4$

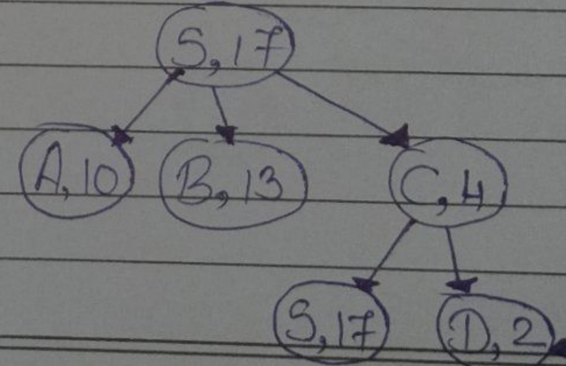


Step 2:

F-score of successors

$f(S) = h(S) = 17$

$f(D) = h(D) = 2$



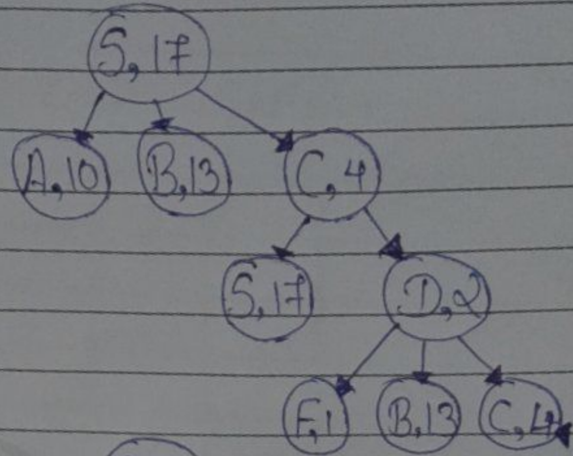
Step 3:

F-score of successor

f(C) = h(C) = 4

f(B) = h(B) = 13

f(F) = h(F) = 1



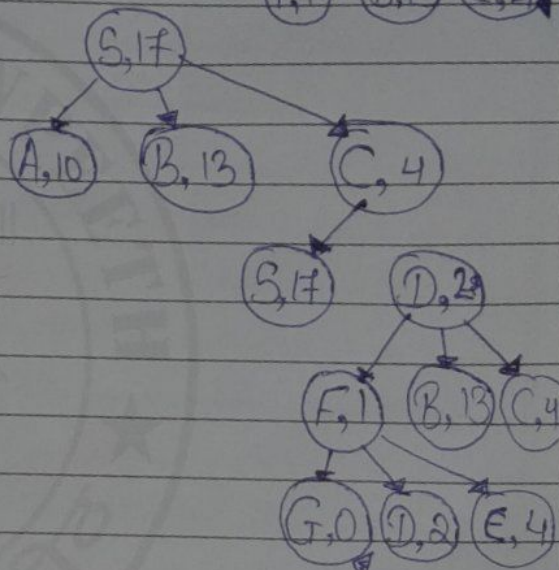
Step 4:

F-Score of successor

f(D) = h(D) = 2

f(E) = h(E) = 4

f(4) = h(G) = 0

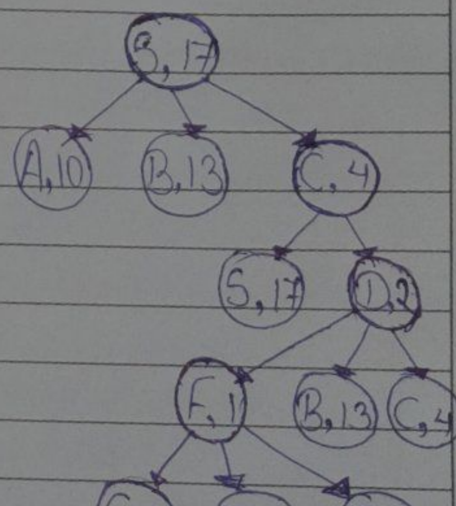


Step 5:

Solution is:

S → C → D → ~~E~~ F → G with

Solution cost : 10+6+6+3
= 25



Q2 Consider following instance of 8 puzzle problem.

8	7	6
2	1	5
3	4	-

Initial configuration

-	8	7
2	1	6
3	4	5

Goal configuration

Consider Heuristic functions defined below:
h1: Misplaced tiles count except space
h2: Correctly placed tiles count except space
h3: Sum of manhattan distance between current and correct position of all times except space.

a) In 8 puzzle problem we are concerned with getting to goal configuration within least number of steps. All moves are thus equally costly. Define g(n) in your own words. What will be cost of 6 step solution to some arbitrary 8 puzzle instance?

→ The lowest path ~~cost~~ cost g(n) can be the cost to reach the goal configuration in least steps:-
In our case, we can reach the final configuration in at least 4 moves: ~~UP, UP DOWN~~ UP, UP, LEFT, LEFT
Since all moves are equally costly, we compute g(n) as:-
g(n) = 1+1+1+1
g(n) = 4.

Consider the following arbitrary 8 puzzle instance which gives solution in 6 steps:

8	7	6
2	1	5
–	3	4

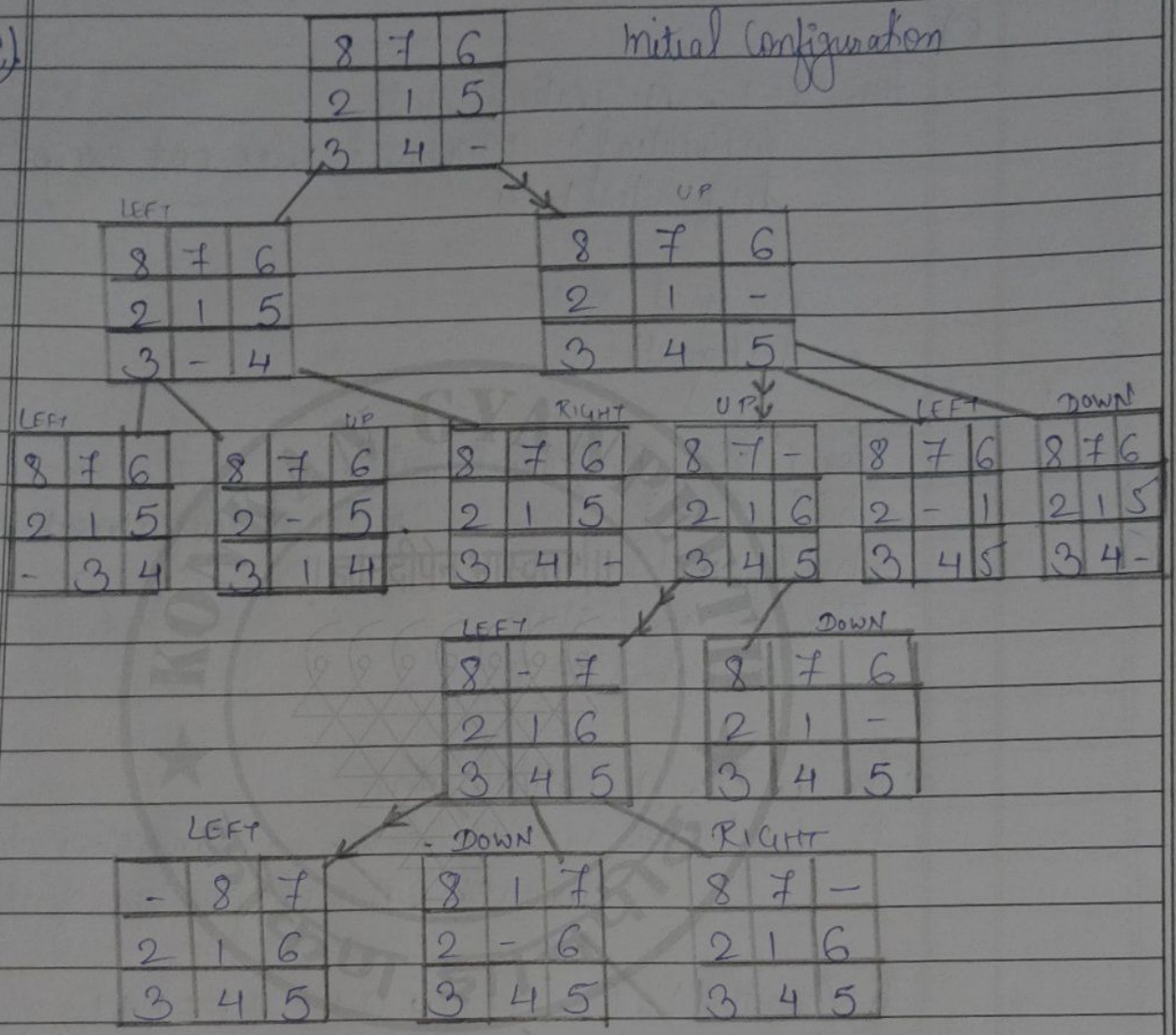
The solution can be ~~rep~~ represented as:-

{{8,7,6},{2,1,5},{-,3,4}} → {{8,7,6},{2,1,5}{3,-,4}} →
{{8,7,6},{2,1,5},{3,4,-}} → {{8,7,6},{2,1,-}{3,4,5}} →
{{8,7,-},{2,1,6},{3,4,5}} → {{8,-,7},{2,1,6}{3,4,5}} →
{{-,8,7},{2,1,6},{3,4,5}}.

Since all the moves are equally costly, the cost would be.

$g(n) = 6$

→ c)



Final configuration

e)

→ For i = 1, n = initial state

h1(initial) = Misplaced tiles cost except space

h1(initial) = 4

n = goal state

h1(goal) = 0

For i = 2, n = initial state

h2(initial) = Correctly replaced tiles count except space.

h2(initial) = 4

For n = goal state

h2(goal) = 8

For i = 3, n = initial state

h3(initial) = Sum of ~~translation~~ manhattan distance between current & correct position of all tiles except space.

h3(initial) = 0 + 0 + 0 + 0 + 1 + 1 + 1 + 1

= 4

For n = goal state

h3(goal) = 0