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Name :- Kinjal Omprakash Lokiya

Class :- BE IT

Roll No :- 32.

Subject :- AI LAB

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Assignment 1 (A)

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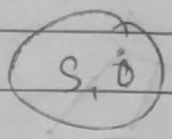
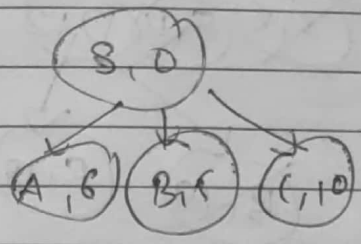
Q.1 A)

(a)

→ Step 0 =



Step 1 =



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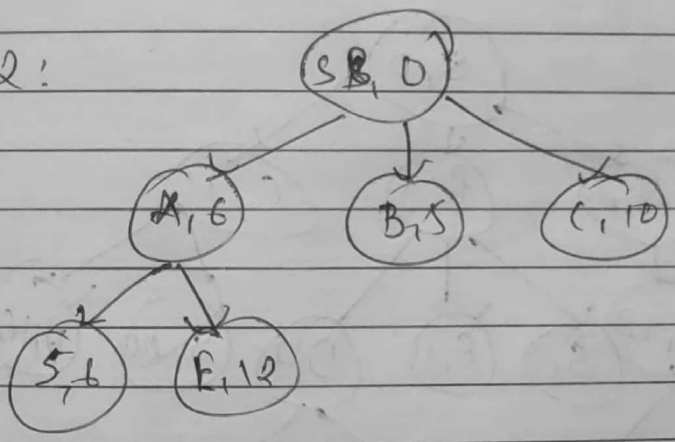

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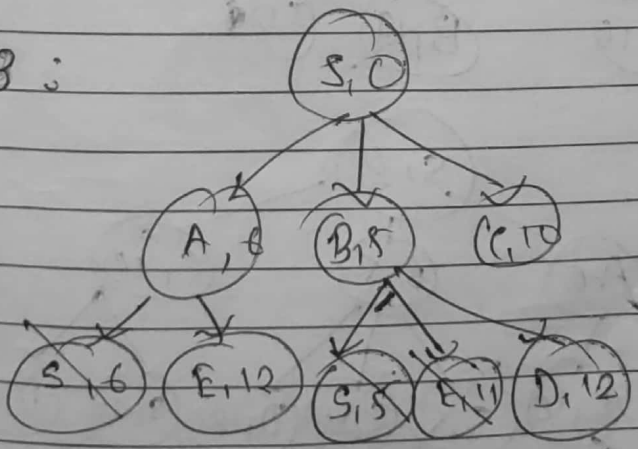

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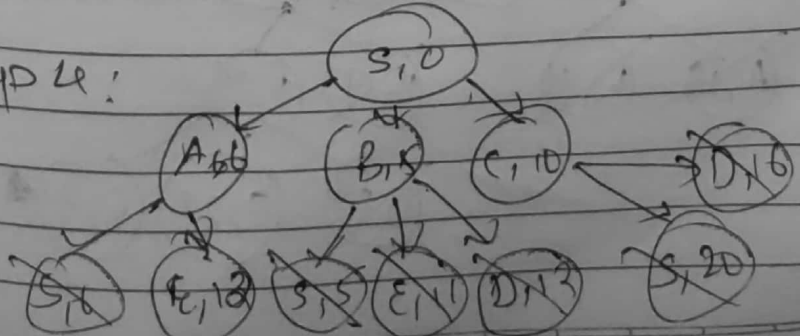

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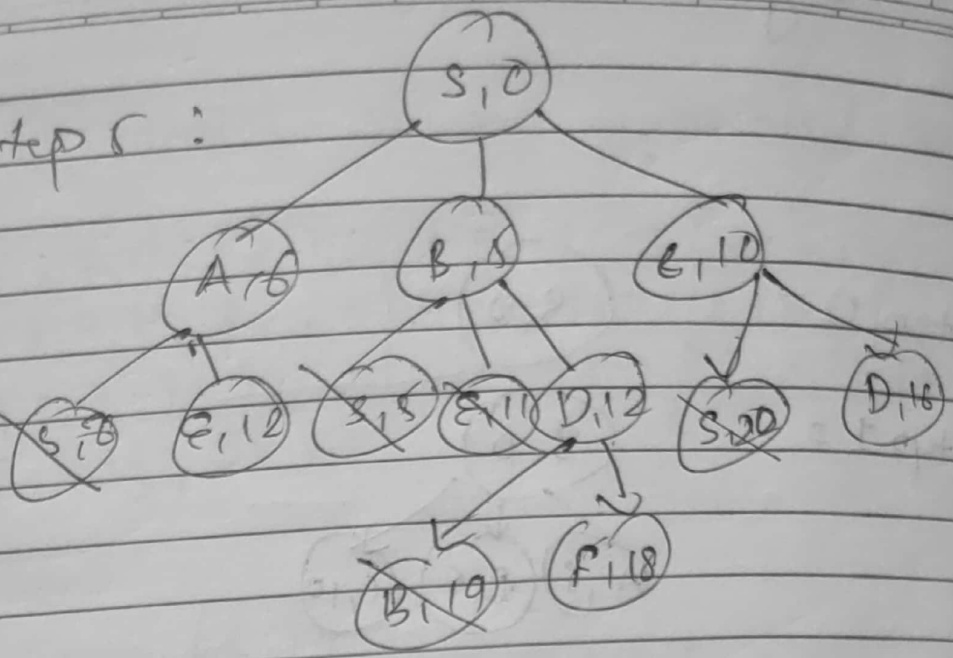
Step 5 :



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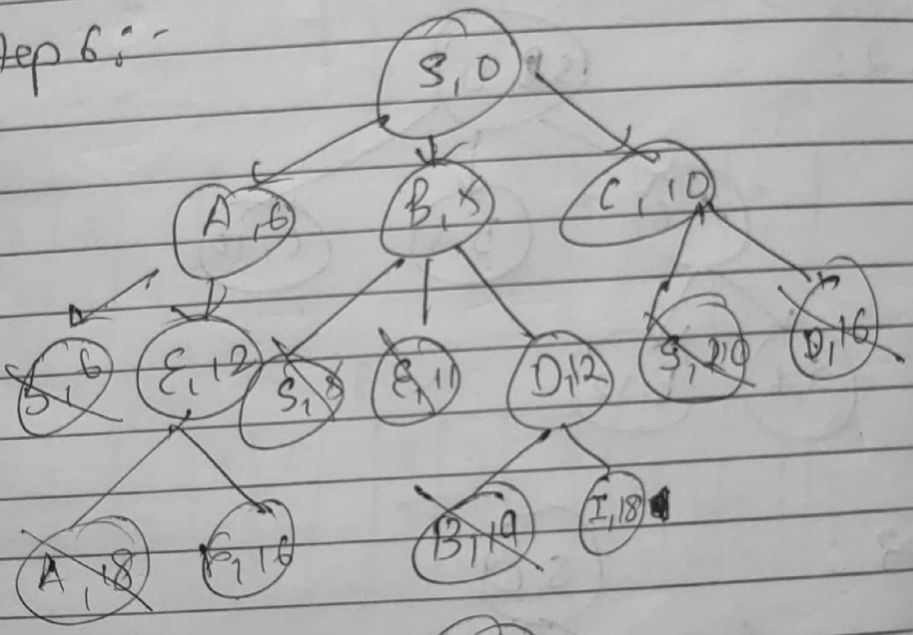

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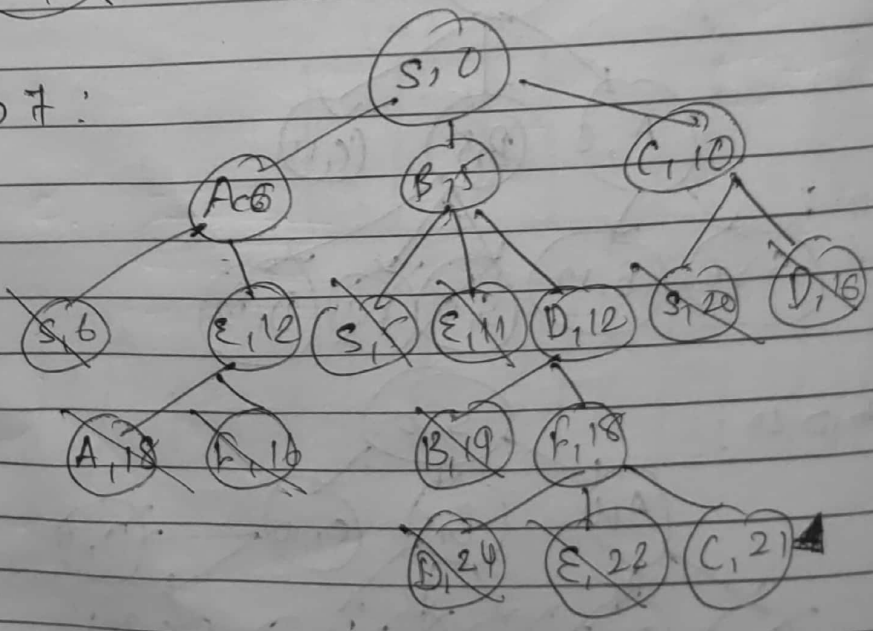

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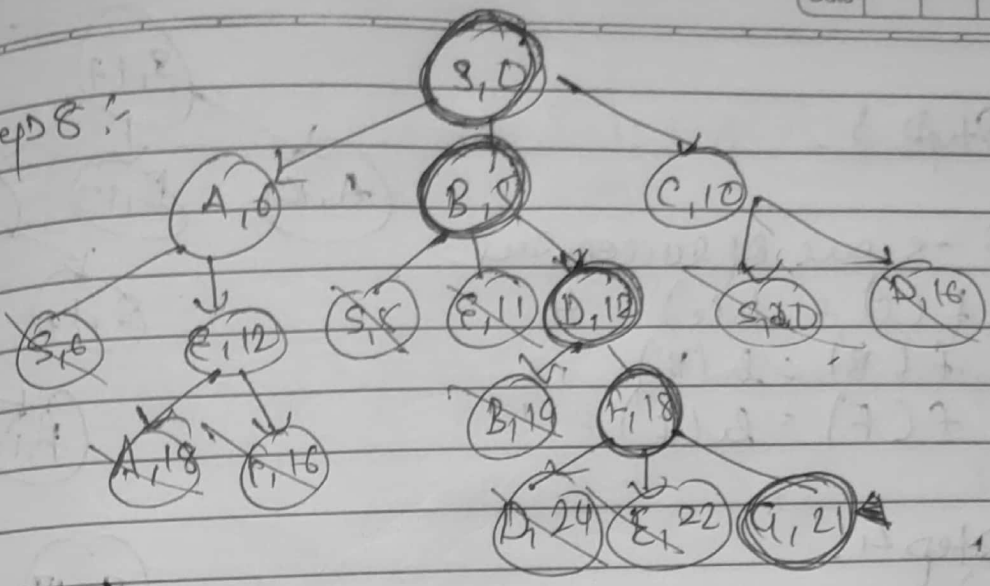
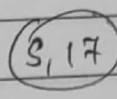
Step 8 :-



(c4)

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

f - score S :- $f(s) = h(s) = 17$



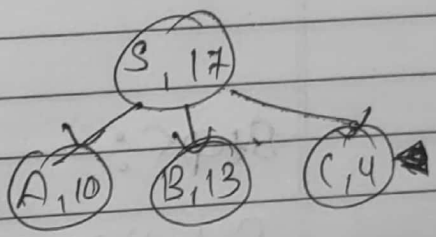
Step 1 :

f - score of successors

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

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

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

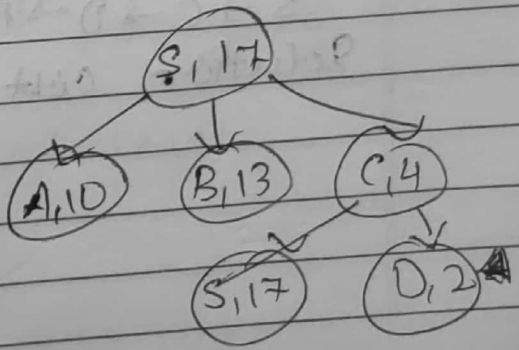


Step 2 :

f - score of successors

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

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



Step 3:

F-score of successors

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

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

$f(F) = h(F) = 1$

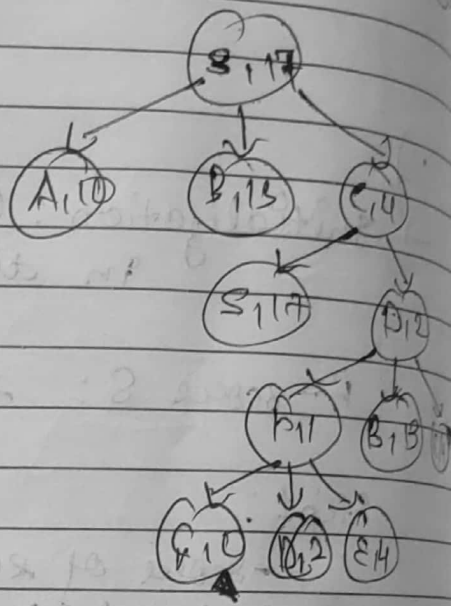
Step 4:

F-score of successors

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

$f(E) = h(E) = 4$

$f(G) = h(G) = 0$



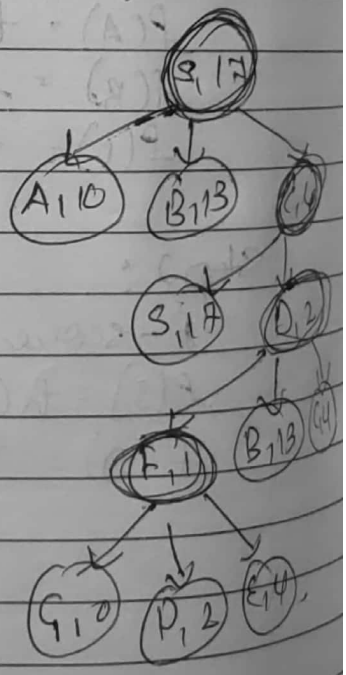
Step 5:-

Solution is -

$S \to C \to D \to F \to G$ with

Solution cost is $= 10 + 6 + 6 + 3$

$= 25$.



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Q.2 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 function defined below

h_1 :- misplaced tiles count except space

h_2 :- correctly plaied tiles count except space

h_3 :- sum of manhattan between current & correct position of all time except space

* Answer the following

a)

→ The lowest path cost $g(n)$ can be the cost to search the goal configuration in least steps. configuration in two.

In case, we can reach the final configuration in at least 4 moves: up, up, left, left. since all the moves are equally costly we compare $g(n)$ as

$g(n) = 1 + 1 + 1 + 1$

$g(n) = 4$.

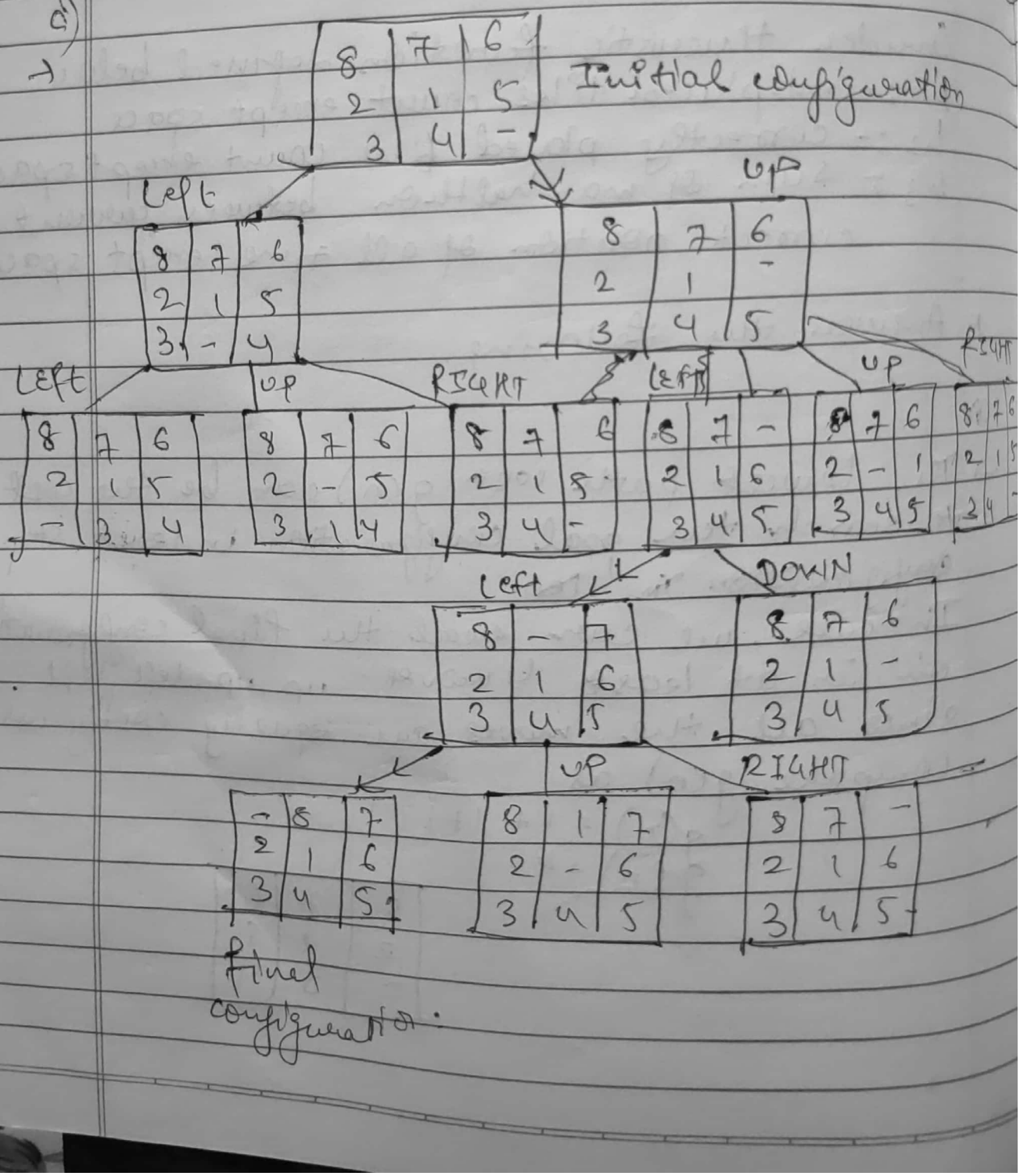
8	7	6
2	1	5
-	3	4

The solution can be represented as:-

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

a)

→



c) Compute $h_i(n)$ where $i = 1, 2, 3$ & n = initial state, goal state from question.

→ For $i = 1$, n = initial state
h_1(initial) = misplaced files count except space
h_1(initial) = 4

h = goal state
h_1(goal) = 0

For $i = 2$, n = initial state
h_2(initial) = correctly placed files count except space

h_2(initial) = 4
For h = goal value
h_2(goal) = 8.

For $i = 3$, n = initial value.
h_3(initial) = sum of manhattan distance between current & correct position of all files except space.
h_3(initial = 0+0+0+0+1+1+1+1
~~h_3(goal) = 0+~~
h_3(initial) = 4
for n = goal state
h_3(goal) = 0.