

Assignment - Part 1A

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Class : BE-IT.

Roll no : 22

Subject : IS Lab.

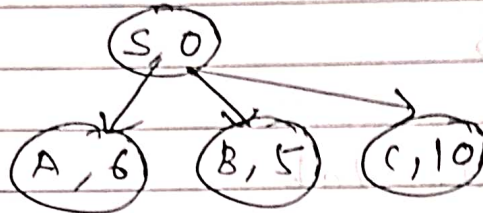
D.O.P	D.O.A	Remark	Sign
(01.07)	(2.07) (2.07)		

Q1.
1.1.)
→

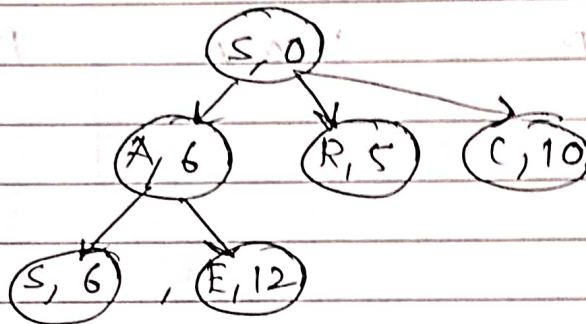
Step 0 :



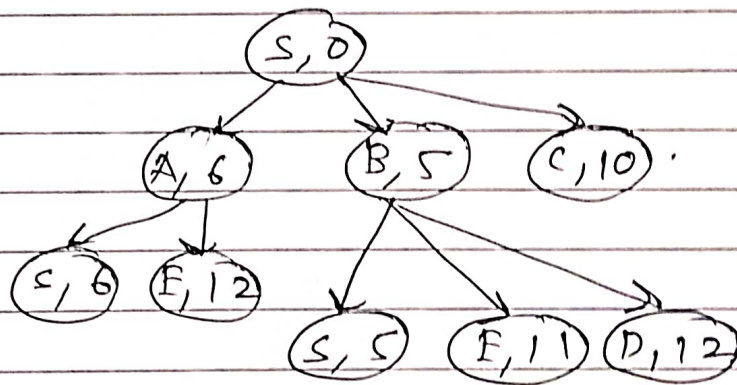
Step 1 :



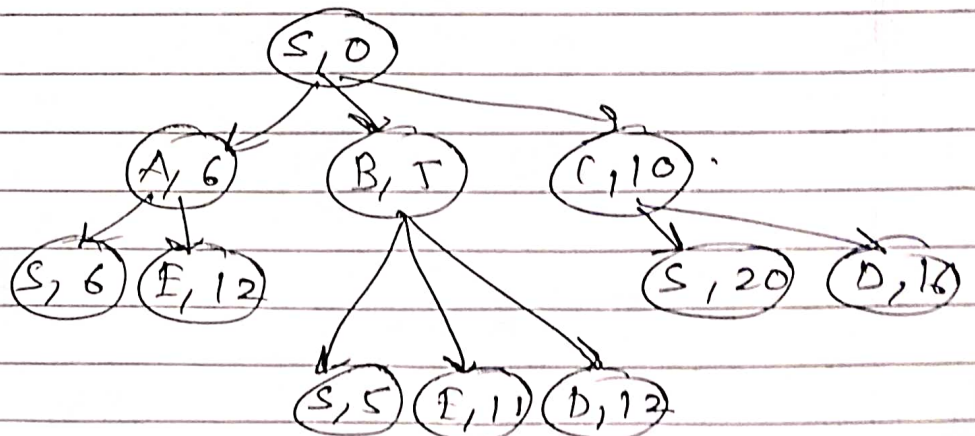
Step 2 :



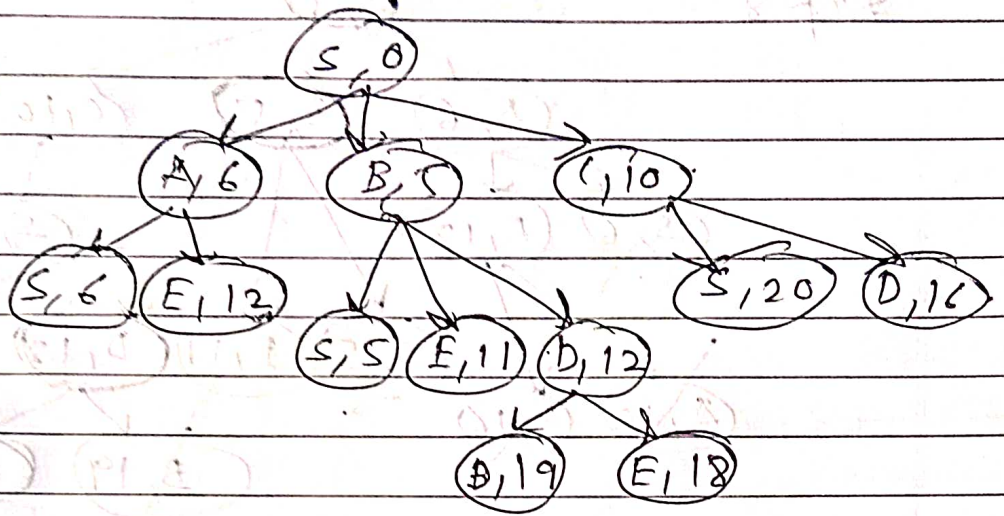
Step 3 :



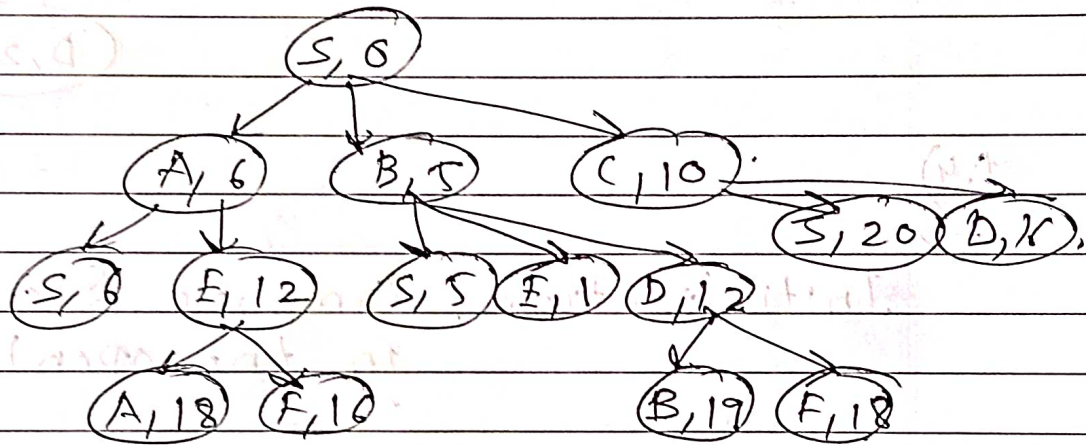
Step 4 :



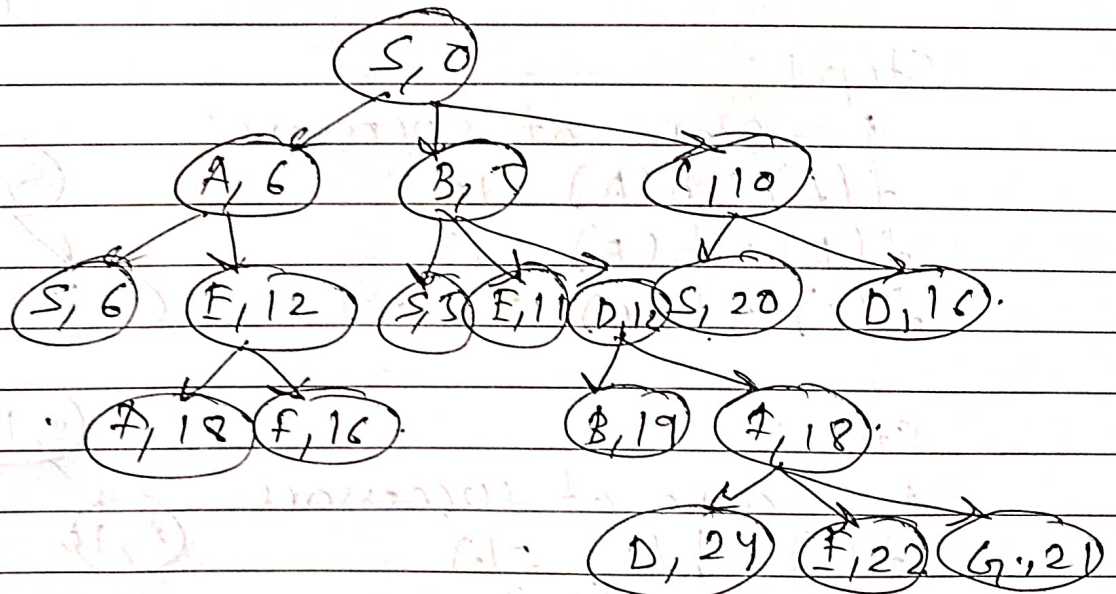
Step 5:



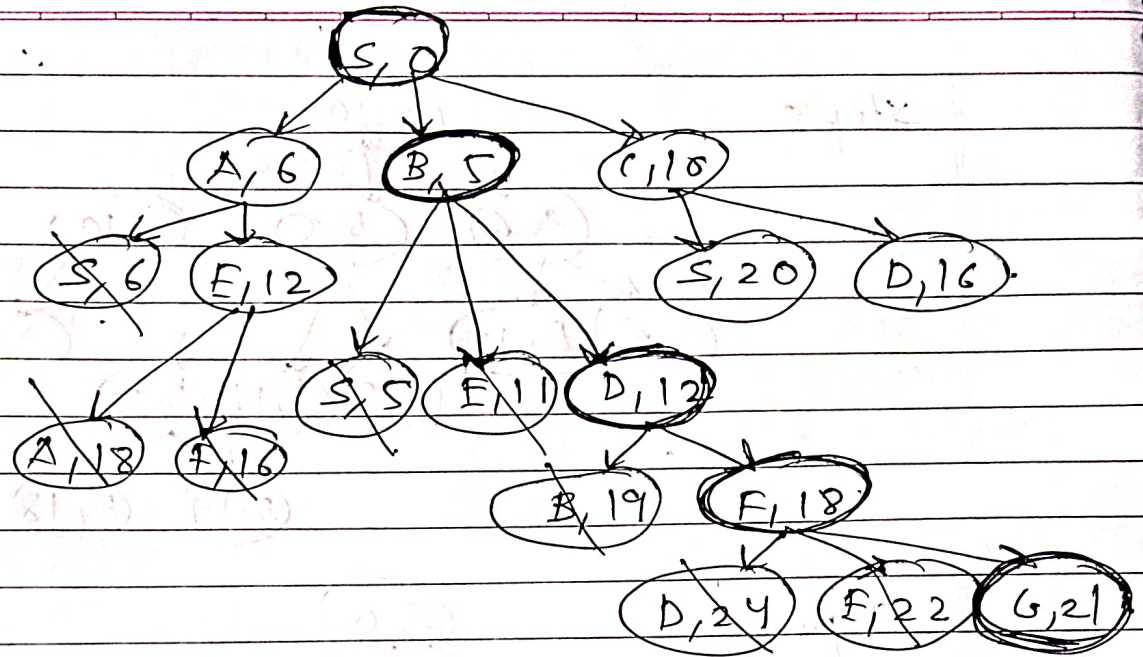
Step 6:



Step 7:



Step 8:



(1.4)
→

Initialization: Compute g score for s & g in the openlist.

$$F = \text{score } s: f(s) = h(s) = 19.$$

$(s, 17)$

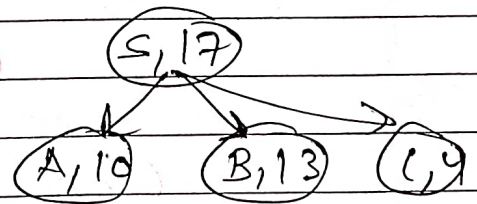
Step 1:

$F = \text{score of successors}$

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

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

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

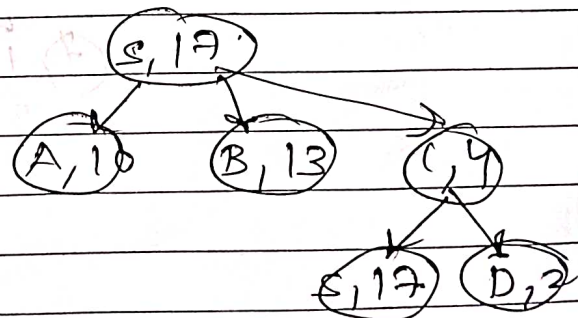


Step 2:

$F = \text{score of successors}$

$$f(s) = h(s) = 19.$$

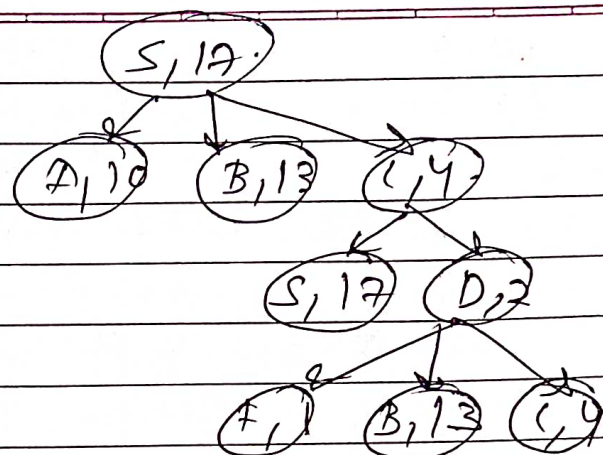
$$f(\emptyset) = h(\emptyset) = 2.$$



Step 3:

F = score of successor.

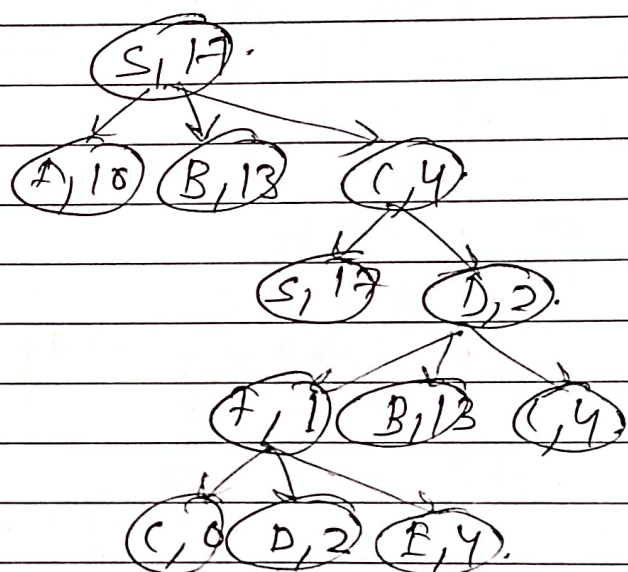
$$\begin{aligned} f(C) &= h(C) = 4 \\ f(B) &= h(B) = 13 \\ f(F) &= h(F) = 1 \end{aligned}$$



Step 4:

F = score of successor.

$$\begin{aligned} f(D) &= h(D) = 2 \\ f(E) &= h(E) = 4 \\ f(C_1) &= h(C_1) = 0 \end{aligned}$$

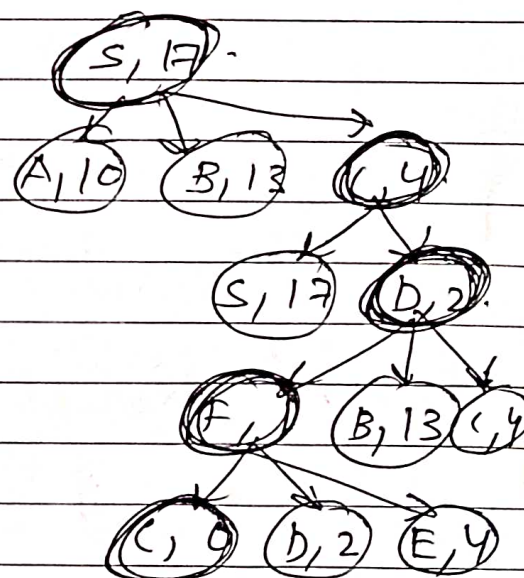


Step 5:

Solution is:

$S \rightarrow C \rightarrow D \rightarrow F \rightarrow G$ with.

$$\begin{aligned} \text{solution cost} &= 10 + 6 + 6 + 3 \\ &= 25 \end{aligned}$$



Q2)

a)

The lowest path 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 a last 4 moves: 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 8 puzzle instance

8	7	6
2	1	5
-1	3	4

Solution can be represented as:

$$\begin{aligned} &\{\{8, 7, 6\} \{2, 1, 5\} \{-3, 4\}\} \Rightarrow \{\{8, 7, 6\} \{2, 1, 5\}, \{3, -1, 4\}\} \\ &\{\{8, 7, 6\} \{2, 1, 5\} \{3, 4, -1\}\} \Rightarrow \{\{8, 7, 6\} \{2, 1, -3\}, \{3, 4, 5\}\} \\ &\{\{8, 7, -1\} \{2, 1, 5\} \{3, 4, 5\}\} \Rightarrow \{\{8, -7\} \{2, 1, 6\} \{3, 4, 5\}\} \\ &\{\{-1, 8, 7\}, \{2, 7, 6\}, \{3, 4, 5\}\}. \end{aligned}$$

Since all the moves are equally costly the cost would be

$$g(n) = 6.$$

C.

→

8	7	6
2	1	5
3	4	-

Initial config.

left

up

8	7	6
2	1	5
3	-	4

8	7	6
2	1	-
3	4	5

left

up

right

up

left

down

8	7	6
2	1	5
-	3	4

8	7	6
2	-	5
3	1	4

8	7	6
2	1	5
3	4	-

8	7	-
2	-	1
3	4	5

8	7	6
2	-	1
3	4	5

left

down

8	-	7
2	1	6
3	4	5

8	7	6
2	1	-
3	4	5

left

down

right

-	8	7
2	1	6
3	4	5

8	1	7
2	-	6
3	4	5

8	7	-
2	1	6
3	4	5

final configuration.

For $i=1$, $n = \text{initial state}$

$h_1(\text{initial}) = \text{Misplaced tiles count except space.}$
 $h_1(\text{initial}) = 4.$

$n = \text{goal state.}$

$h_1(\text{goal}) = 0.$

For $i=2$, $n = \text{initial state.}$

$h_2(\text{initial}) = \text{correctly placed tile count except space.}$

$h_2(\text{initial}) = 4.$

For $n = \text{goal state.}$

$h_2(\text{goal}) = 8.$

For $i=3$, $n = \text{initial state.}$

$h_3(\text{initial}) = \text{sum of Manhattan dist between current \& correct position of all tiles except space.}$

$h_3(\text{initial}) = 0+0+0+0+1+1+1+1$
 $= 4.$

For $n = \text{goal state.}$

$h_3(\text{goal}) = 0.$