

# Assignment - 1A

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Date 1/1/6

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Subject: ISLAB

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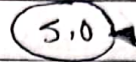
# Assignment - 1(A)

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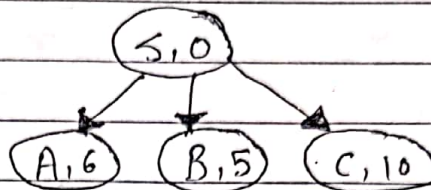
Q.1]

1.1]

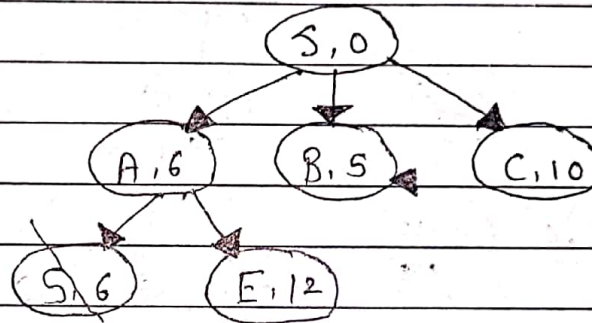
Step 0 :



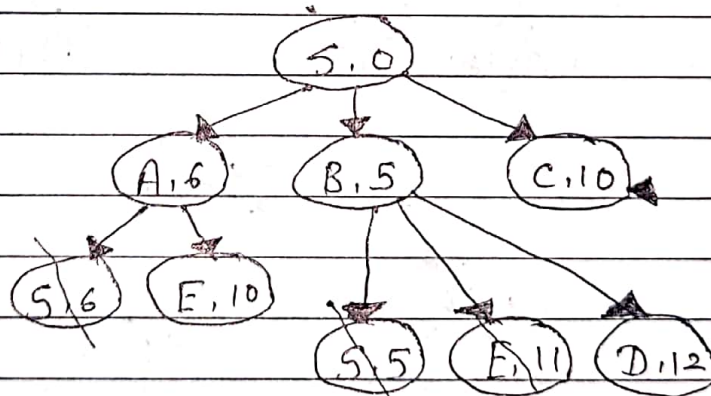
Step 1 :



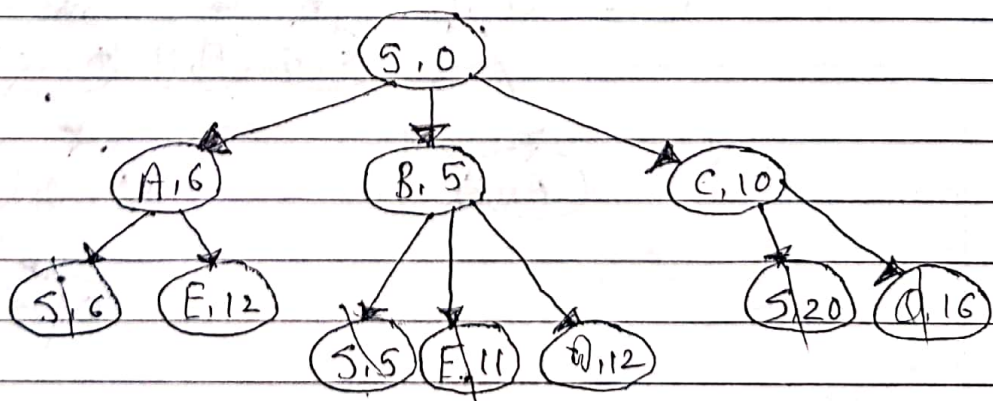
Step 2 :



Step 3 :

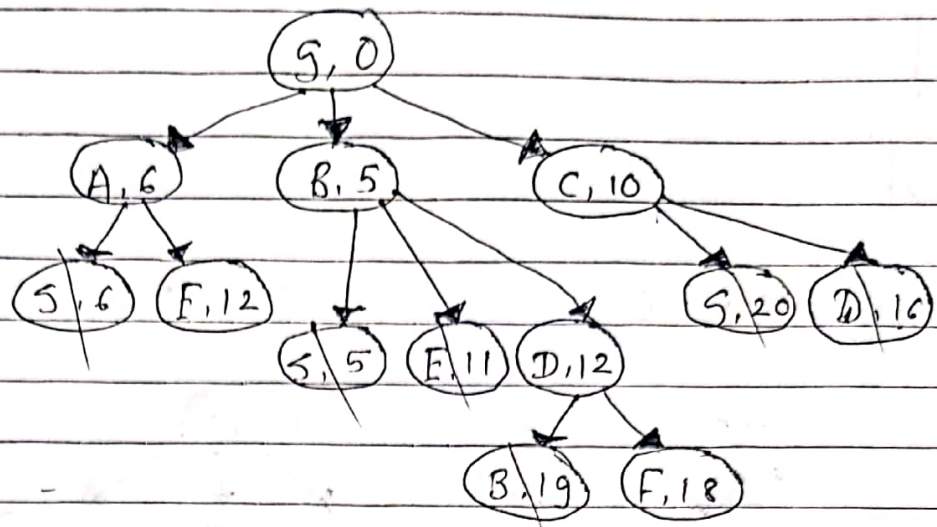


Step 4 :

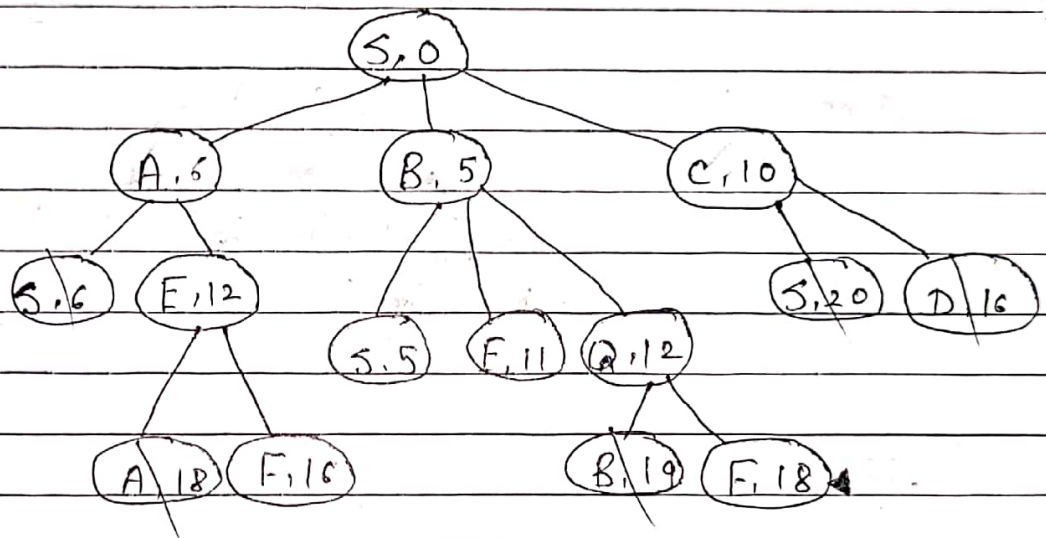




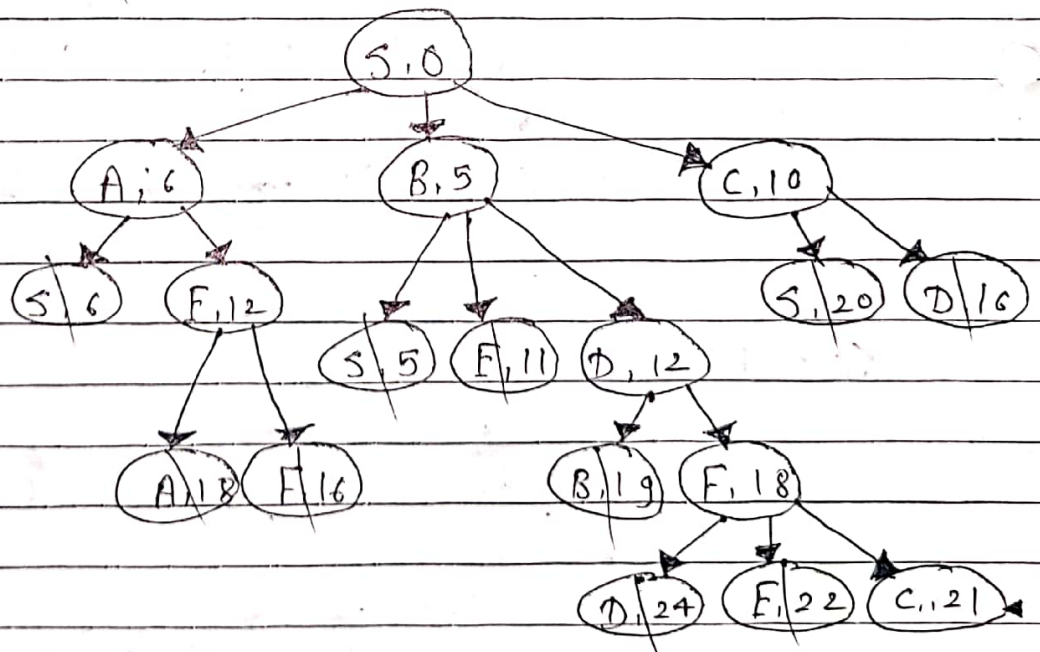
Step 5 :



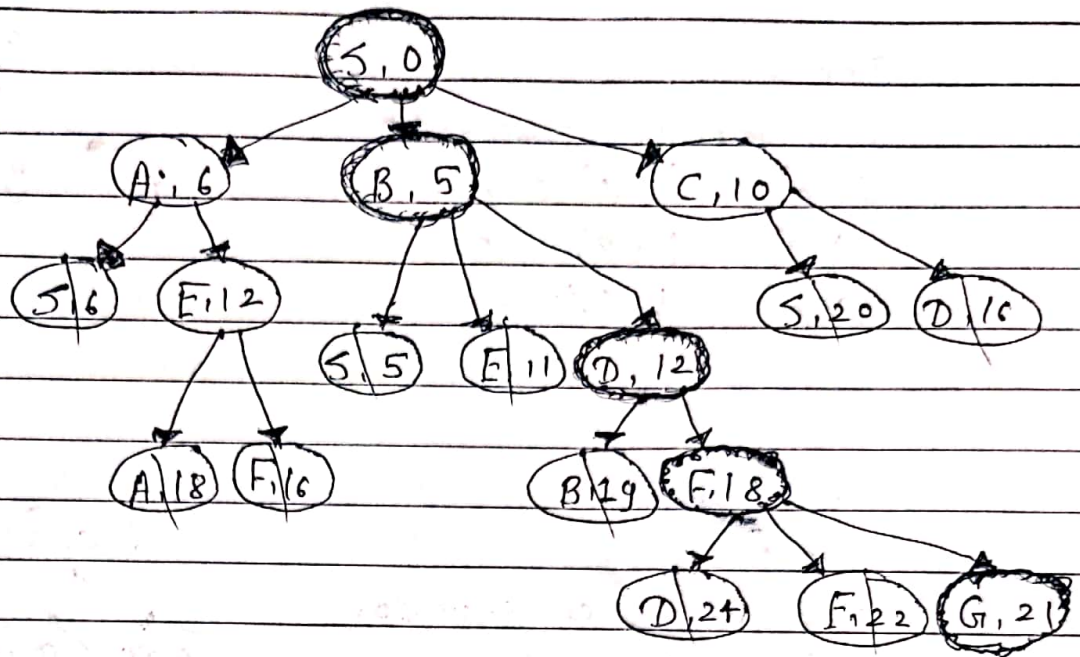
Step 6 :



Step 7 :



Step 8:



1.4

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

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

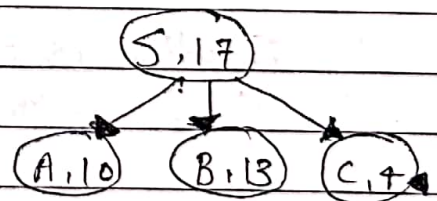
Step 1:

F- Score of Successors

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

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

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

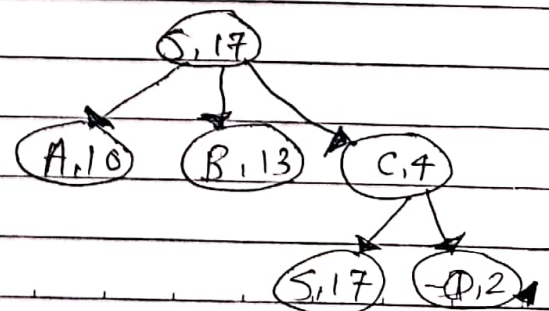


Step 2:

F- Score of Successor  $S$

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

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



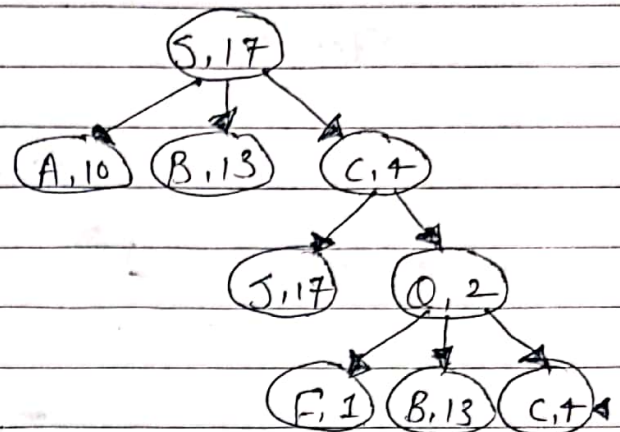
Step 3 :

F - Score of Successor

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

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

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



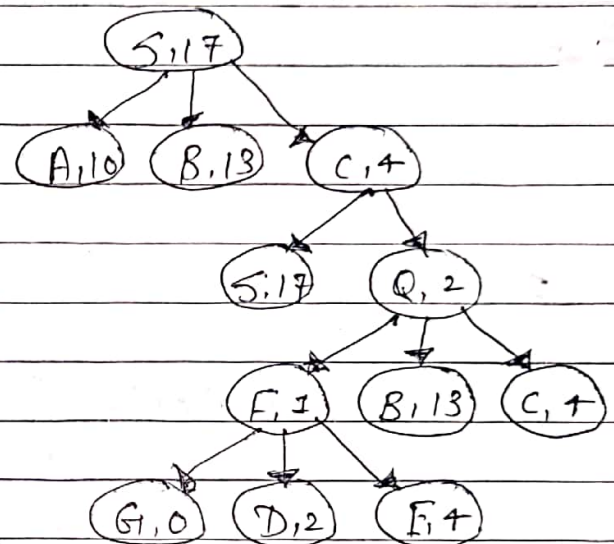
Step 4 :

F - Score of Successor

$$f(Q) = h(Q) = 2$$

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

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

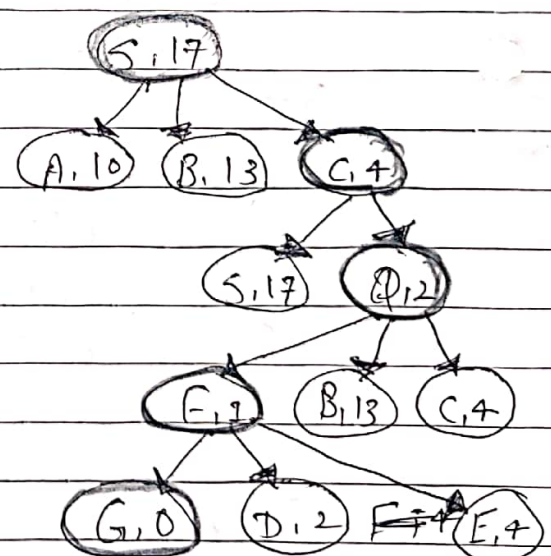


Step 5 :

Solution is -

S → C → D → F → G with

$$\text{Solution cost : } 10 + 6 + 6 + 3 = 25$$





Q-2]

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 at least 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 foll. 8-puzzle instance:

8	7	6
2	1	5
-	3	4

Solution can be represented as:

$\{ \{ 8, 7, 6 \} \{ 2, 1, 5 \} \{ -, 3, 4 \} \} \rightarrow \{ \{ 8, 7, 6 \} \{ 2, 1, 5 \} \{ 3, -, 4 \} \} \rightarrow$   
 $\{ \{ 8, 7, 6 \} \{ 2, 1, 5 \} \{ 3, 4, - \} \} \rightarrow \{ \{ 8, 7, 6 \} \{ 2, 1, - \} \{ 3, 4, 5 \} \} \rightarrow$   
 $\{ \{ 8, 7, - \} \{ 2, 1, 5 \} \{ 3, 4, 5 \} \} \rightarrow \{ \{ 8, -, 7 \} \{ 2, 1, 6 \} \{ 3, 4, 5 \} \} \rightarrow$   
 $\{ \{ -, 8, 7 \} \{ 2, 1, 6 \} \{ 3, 4, 5 \} \}$

Since all the moves are equally costly the cost would be

$$g(n) = 6$$

5. path:

c)

8	7	6	
2	1	5	
3	4	-	

Initial config.

Left

8	7	6				8	7	6
2	1	5				2	1	-
3	-	4				3	4	5

up

Left

8	7	6		8	7	6		8	7	6		8	7	-		8	7	6		8	7	6
2	1	5		2	-	5		2	1	5		2	-	1		2	-	1		2	1	5
-	3	4		3	1	4		3	4	-		3	4	5		3	4	5		3	4	-

up

right

up

left

down

left

8	-	7				8	7	6
2	1	6				2	1	-
3	4	5				3	4	5

Down

left

-	8	7				8	1	7				8	7	-
2	1	6				2	-	6				2	1	6
3	4	5				3	4	5				3	4	5

down

right

Final configuration.

e]

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

$h_1(\text{initial}) = \text{Misplaced files count except space}$

$$h_1(\text{initial}) = 4$$

$n = \text{goal state}$

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

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

$h_2(\text{initial}) = \text{Correctly explored files count except space}$

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

For  $n = \text{goal state}$

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

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

$h_3(\text{initial}) = \text{Sum of translation dist. between current \& correct position of all files except space.}$

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

For  $n = \text{goal state}$

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