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Class : BE - I T

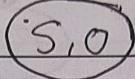
Roll No : 06

Subject : ISLAB

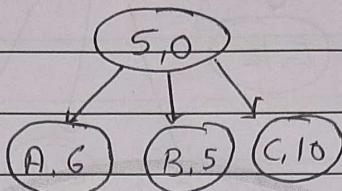
DOP	DOP	Remark	Sign

Q.1  
1.1] →

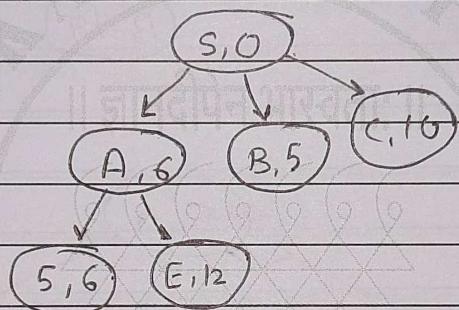
Step 0 :



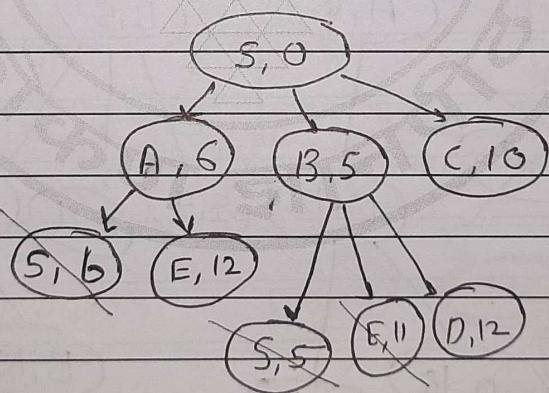
Step 1 :



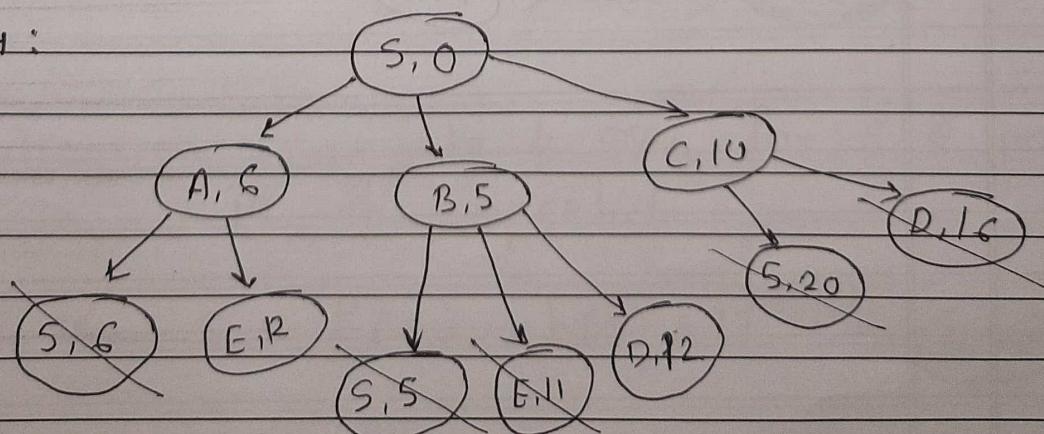
Step 2 :



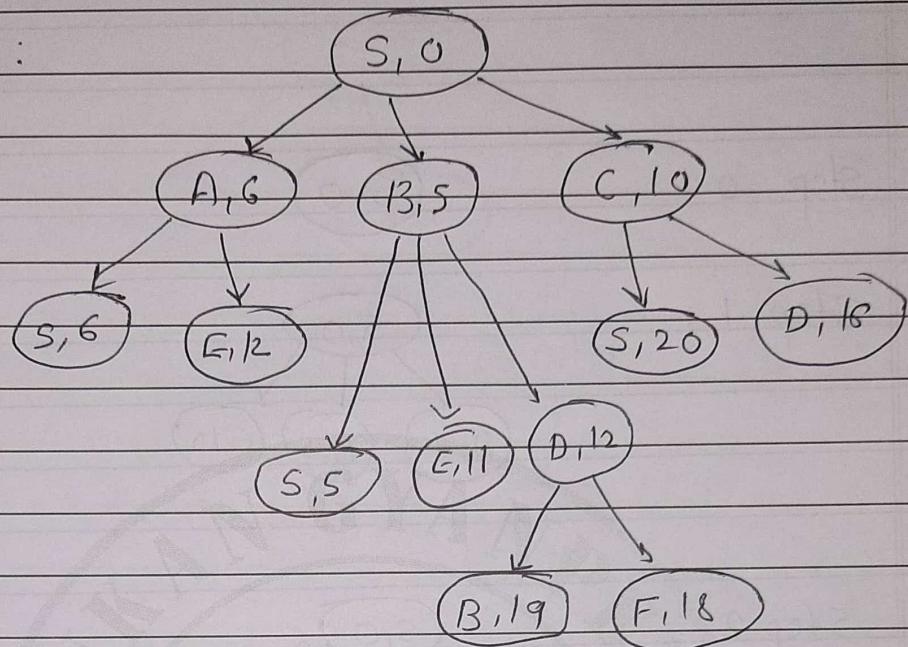
Step 3 :



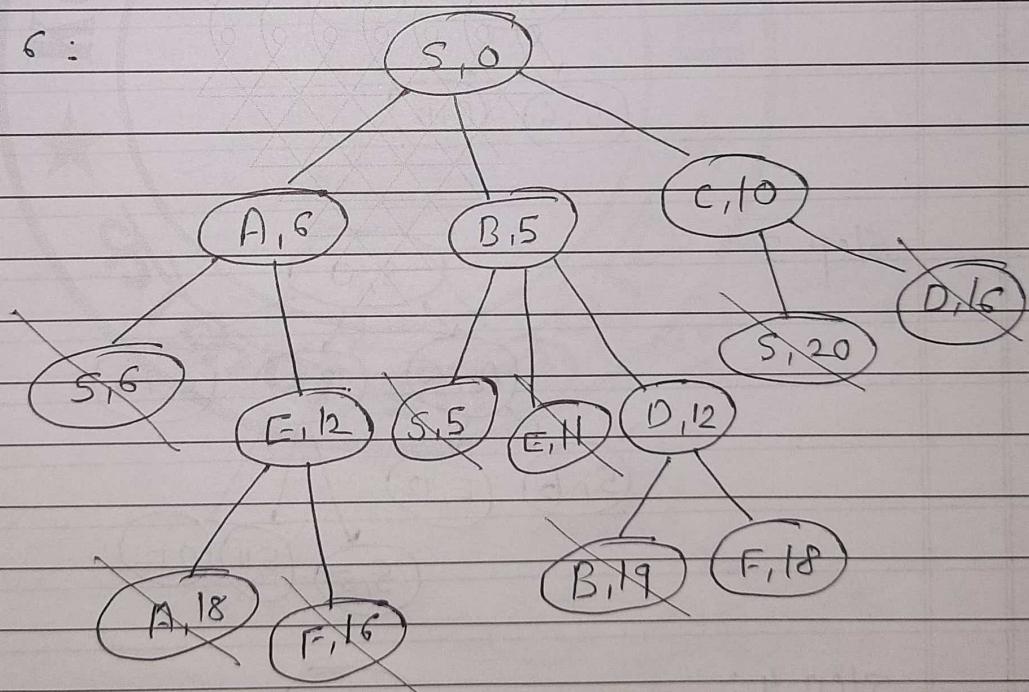
Step 4 :



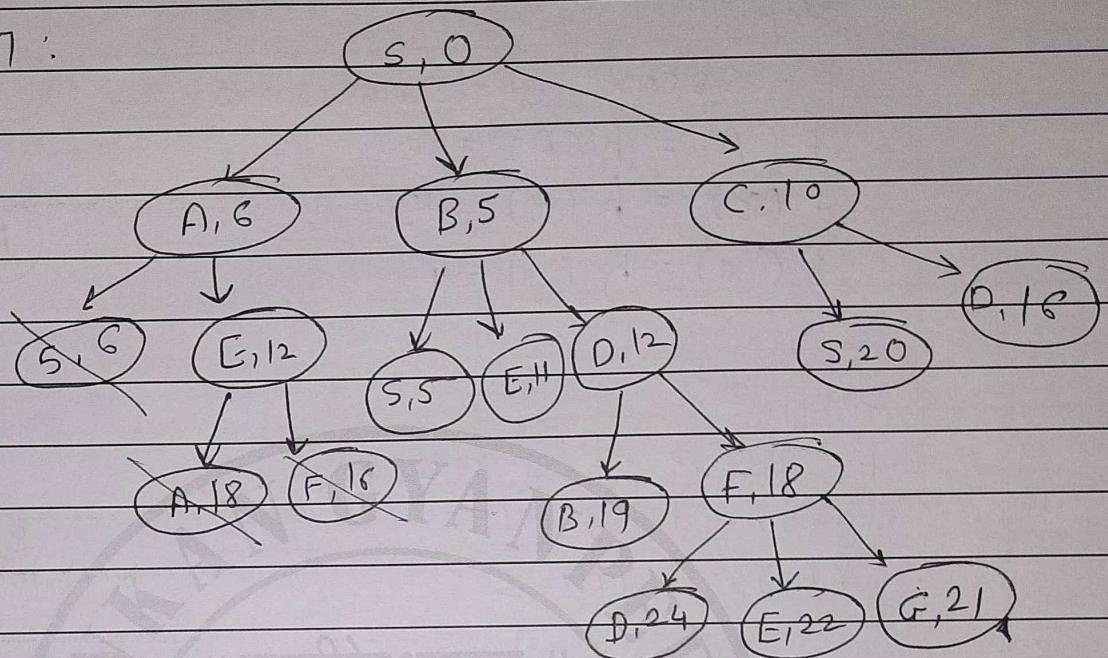
Step 5:



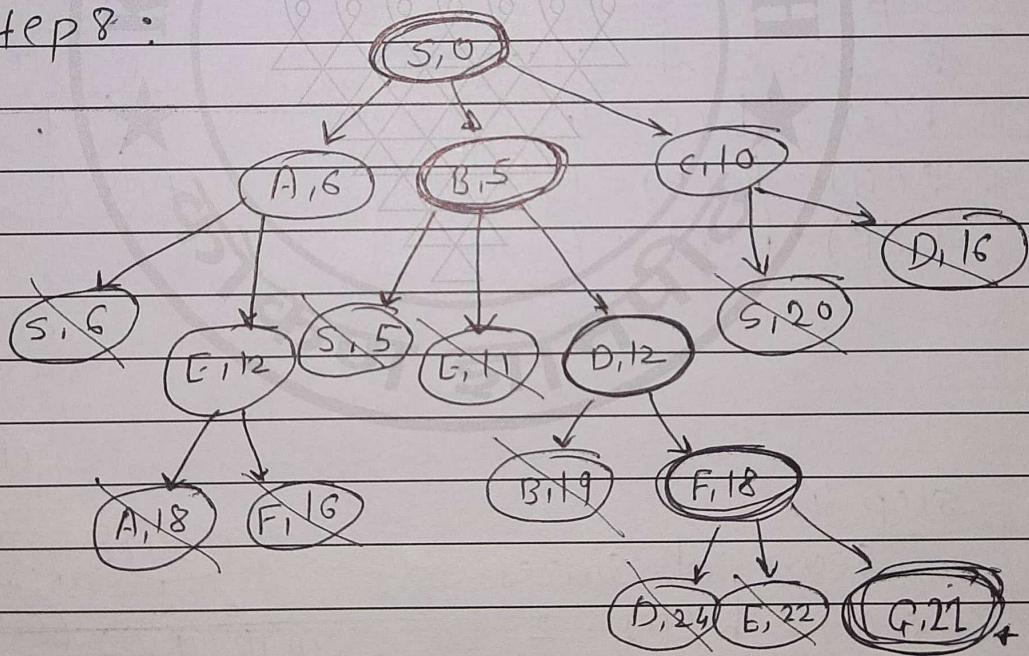
Step 6:



Step 7 :



Step 8 :



1.4)

→ Initialization: Compute  $\phi$  score for  $S$  & put it in the openlist

$$f\text{-score } S : f(S) = h(S) = 17$$

(S, 17)

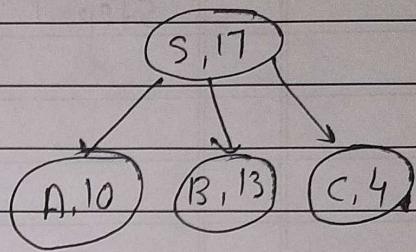
Step 1:

F - Score of successors

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

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

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

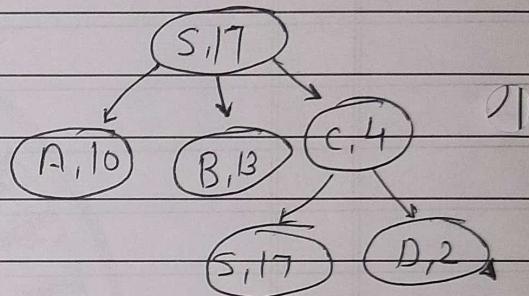


Step 2:

F - Score of successors

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

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



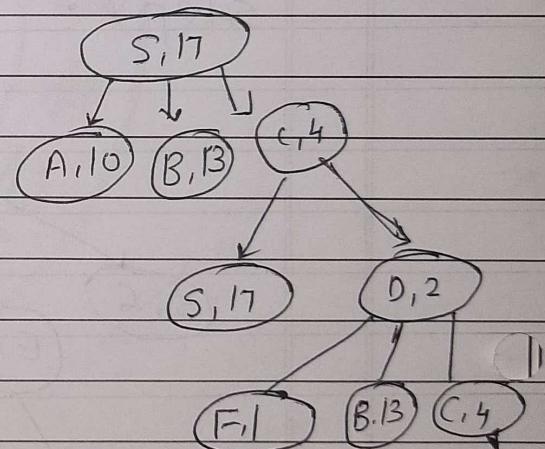
Step 3:

F - Score of successors

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

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

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



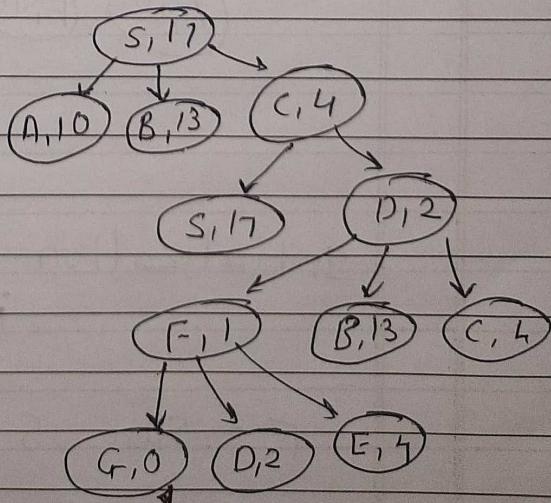
Step 4:

F - Score of successors

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

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

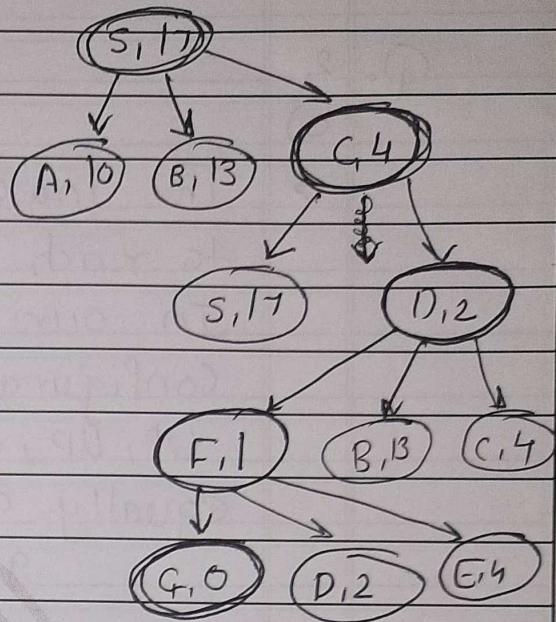
$$f(G) = h(G) = 0$$



Step 5:  
Solution is -

$S \rightarrow C \rightarrow D \rightarrow F \rightarrow G$  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 that 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

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

$$g(n) = 4$$

Now consider the following 8-puzzle instance:

8	7	6
2	1	5
-	3	4

Solution can be represented as:

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

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

Left

Up

right

UF

left

down

8	7	6	8	1	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	-

left

Down

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

left down right

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

## Final configuration

e]

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

$h_2(\text{initial}) = \text{correctly replaced files count except space}$

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

For  $n = \text{goal state}$

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

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

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

$$\begin{aligned} h_3(\text{initial}) &= 0 + 0 + 0 + 0 + 1 + 1 + 1 + 1 \\ &= 4 \end{aligned}$$

For  $n = \text{goal state}$

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