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CLASS :- BE - IT

Roll No :- 28

SUBJECT :- JS LAB

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Q. 1

1. I

Step 0 :

S, 0

Step 1 :

S, 0

A, 6

B, 5

C, 10

Step 2 :

S, 0

A, 6

B, 5

C, 10

S, 6

E, 12

Step 3 :

S, 0

A, 6

B, 5

C, 10

S, 6

E, 12

S, 5

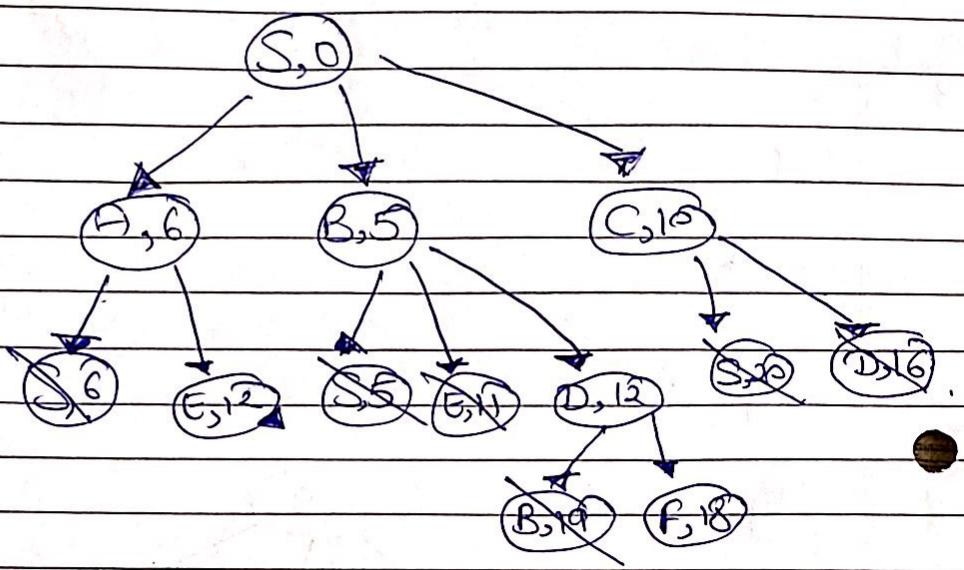
E, 11

D, 12

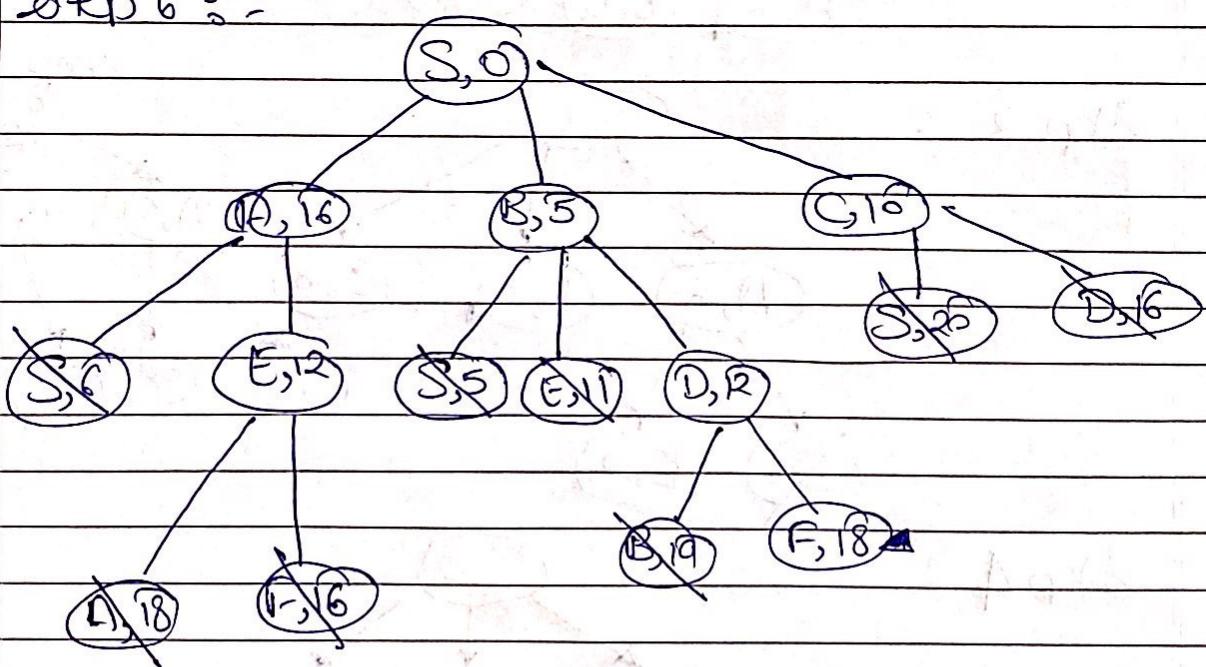
D, 16

S, 20

Step 5 :-



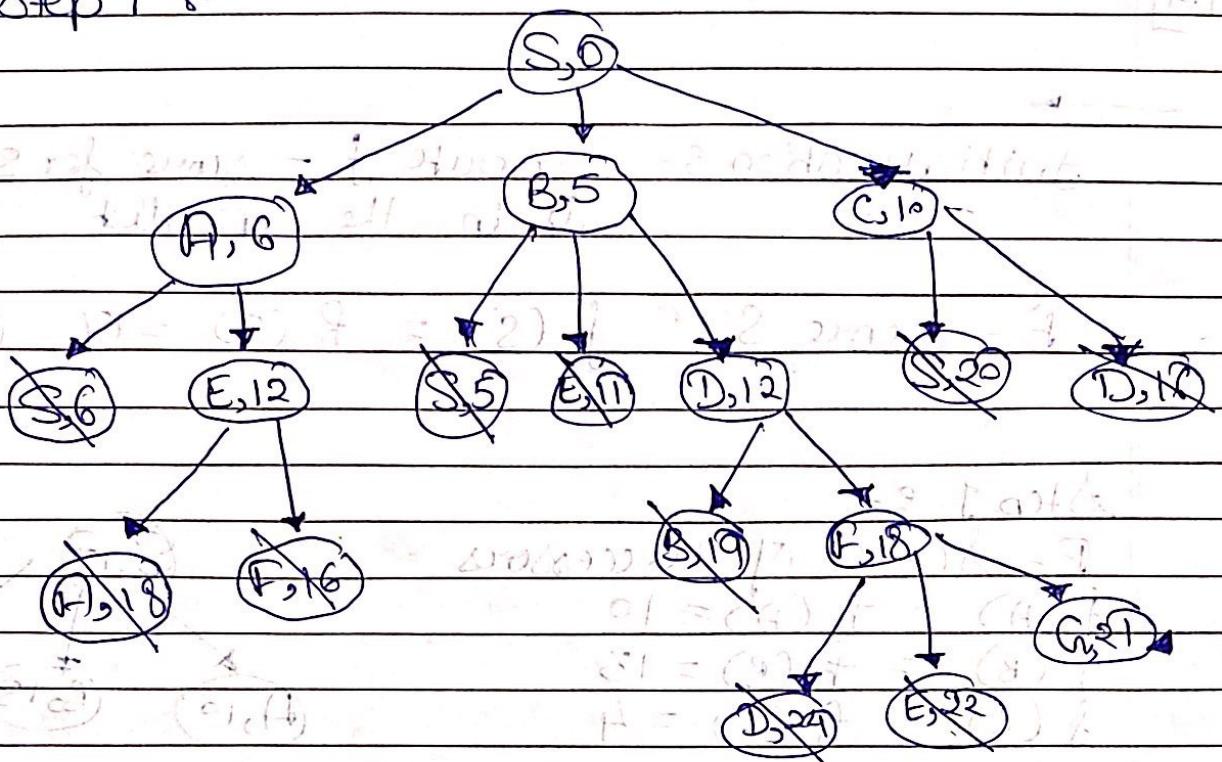
Step 6 :-



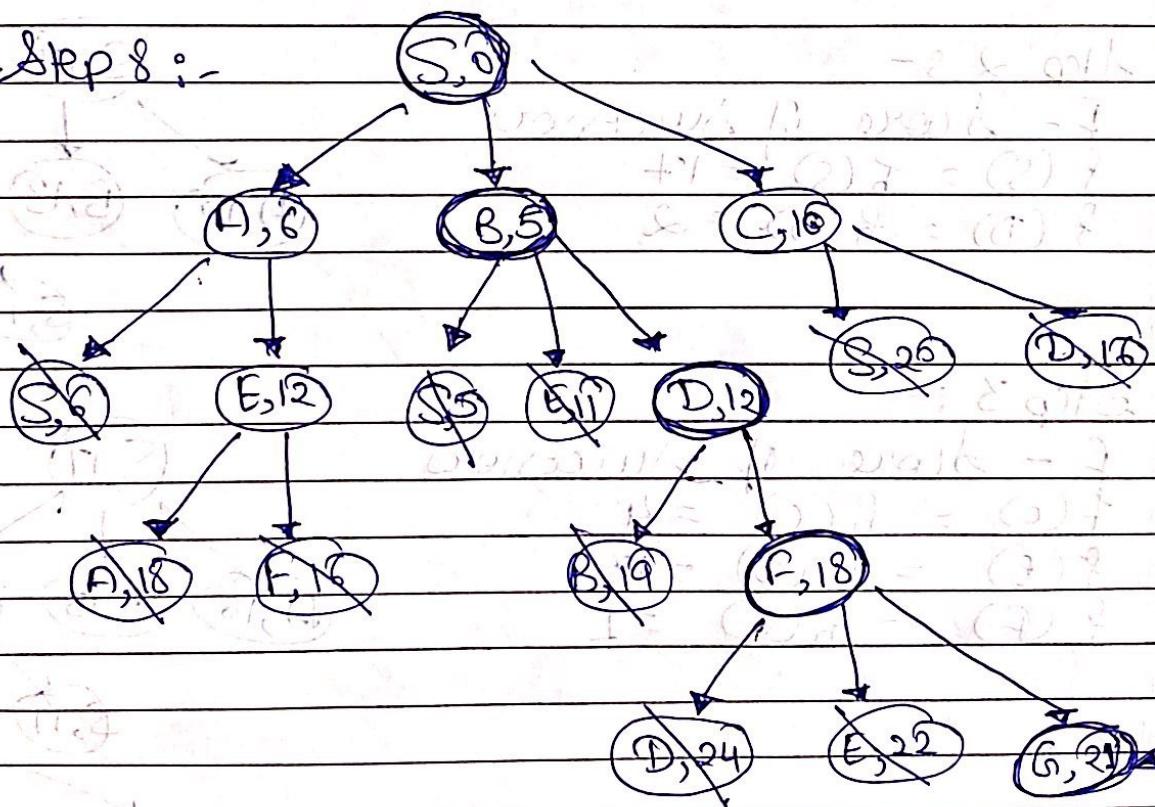
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Step 7 :-



Step 8 :-



1.4]

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

$$F\text{-score } S, f(S) = f(S) = 17, (S, 17)$$

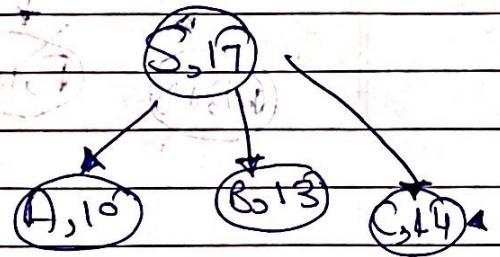
Step 1 :-

F-score of successors

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

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

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

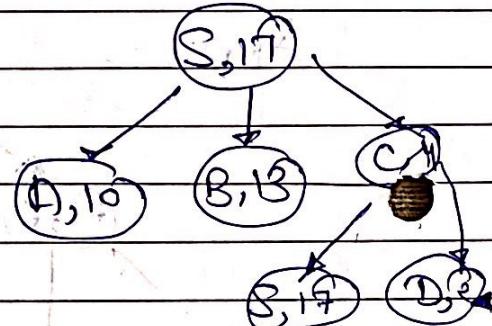


Step 2 :-

F-score of successors

$$f(S) = f(C) = 17$$

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



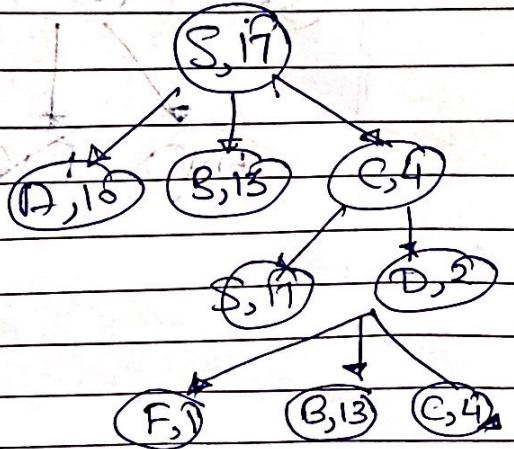
Step 3 :-

F-score of successors

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

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

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



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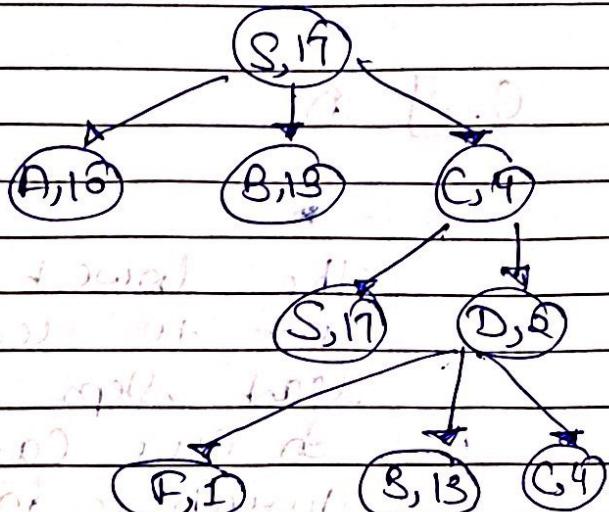
Step 4 :-

F - score of successor

$$f(CD) = h(CD) = 2$$

$$f(CE) = h(CE) = 4$$

$$f(CG) = h(CG) = 0$$

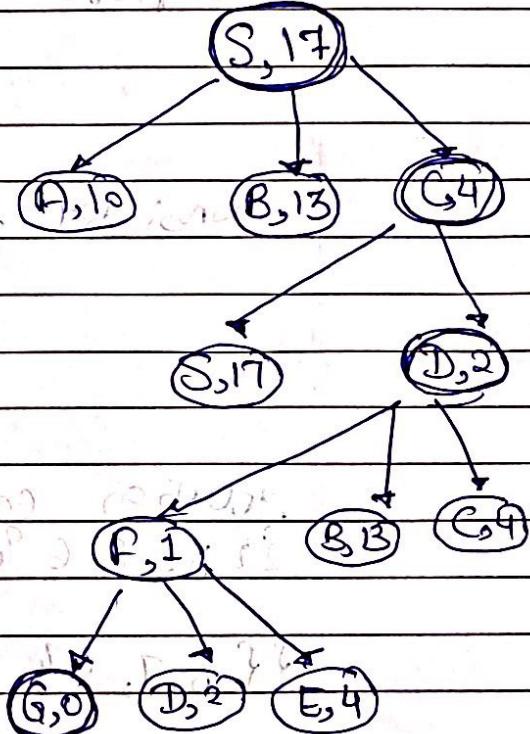


Step 5 :- $f = f + g + h$ (a)

Solution is -

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

$$\text{solution cost} = 10 + 6 + 6 + 3 \\ = 29$$



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 following 8-puzzle instance:

8	7	6
2	1	5
-	3	4

Solution can be represented as:

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

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

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

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

Since all the moves are equally costly the cost would be $g(n) = 6$

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5.

→

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

8	7	6	4	8	7	6	4	8	7	6	4	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	-

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

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

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

$h_2(\text{initial}) = \text{Correctly replaced tiles count except space.}$

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

For $n = \text{goal state}$

$$h_2(\text{goal}) = 0$$

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

$h_3(\text{initial}) = \text{sum of manhattan distance}$

between current & correct position
of all tiles except space

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

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

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