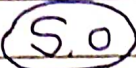
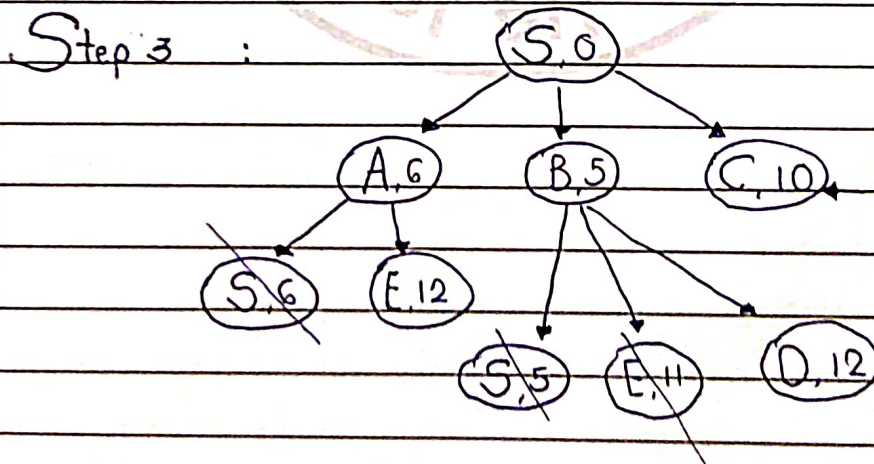
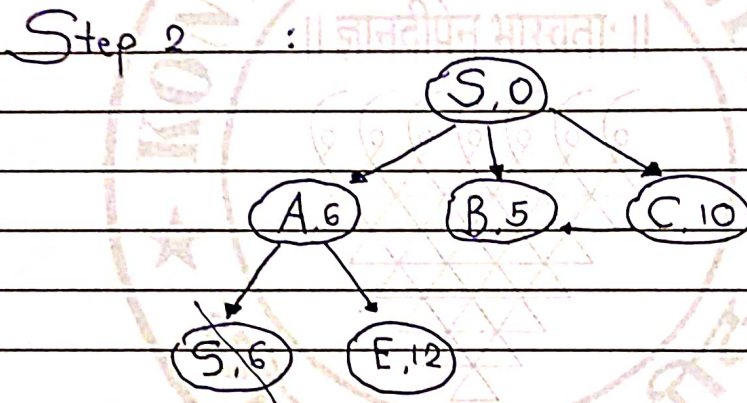
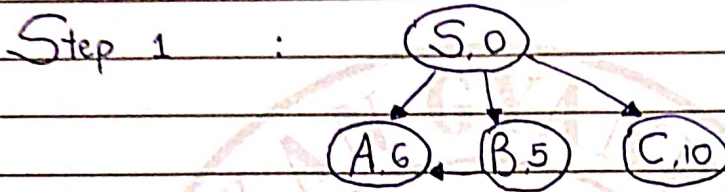


DOP	DoA	Marks	Sign

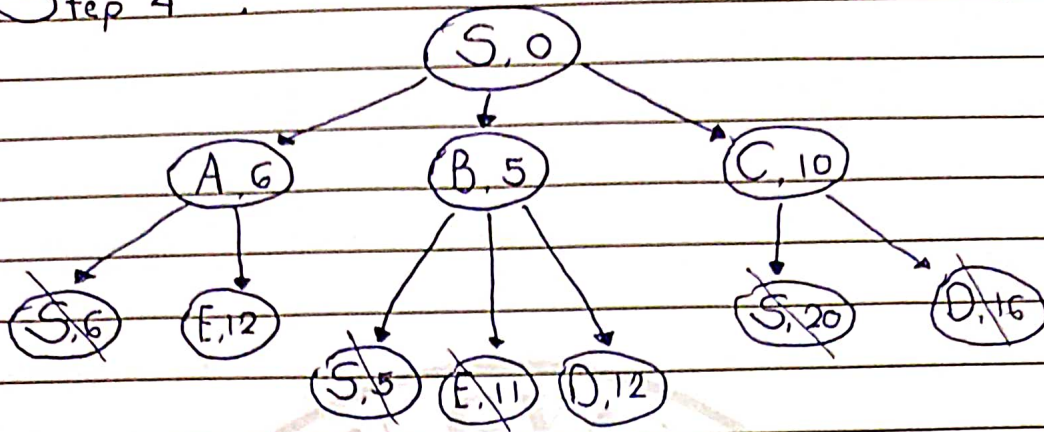
Q.1

1.1]

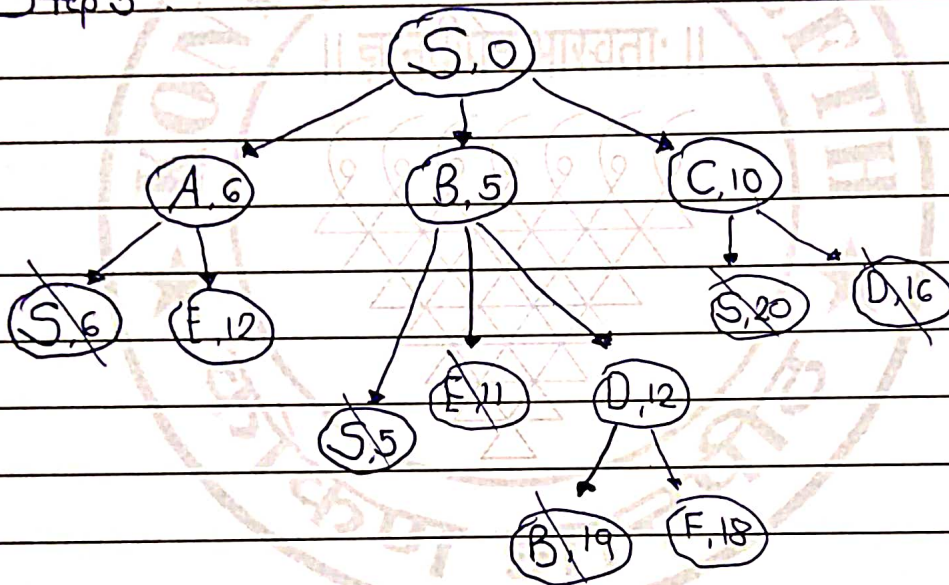
Step 0 : 



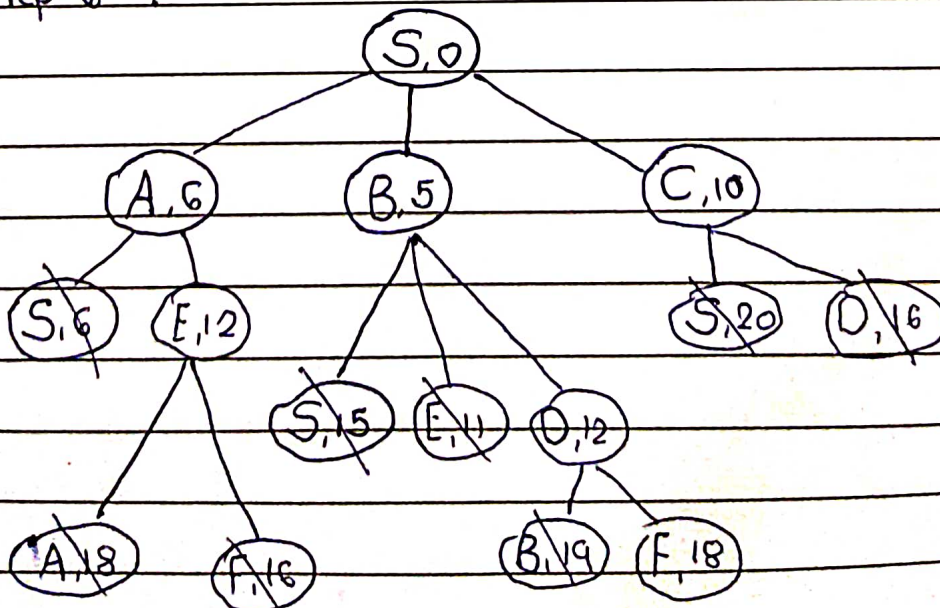
Step 4 :



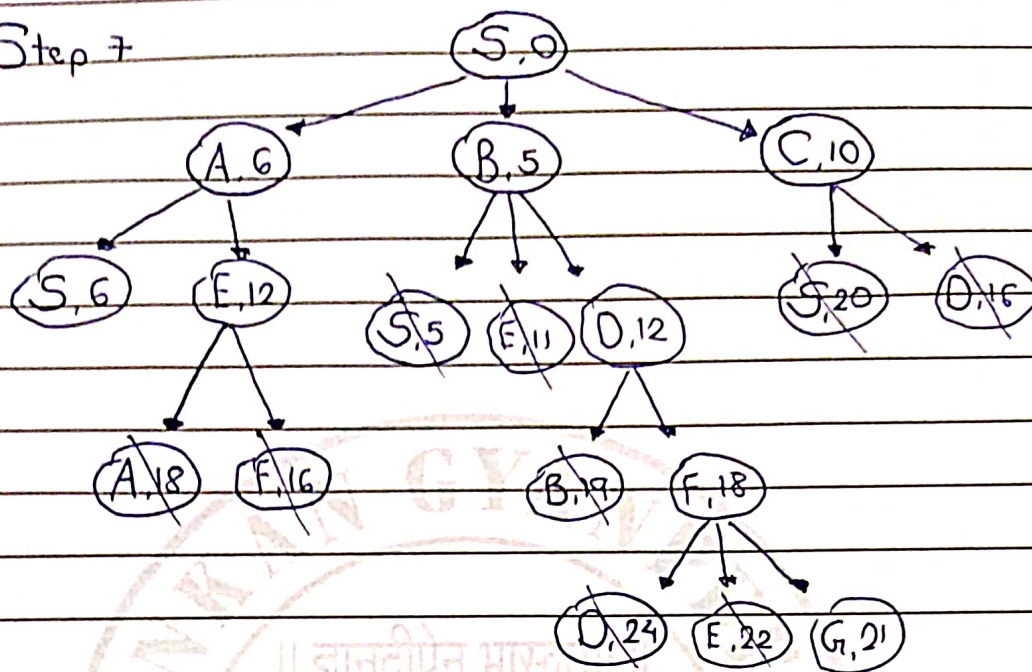
Step 5 :



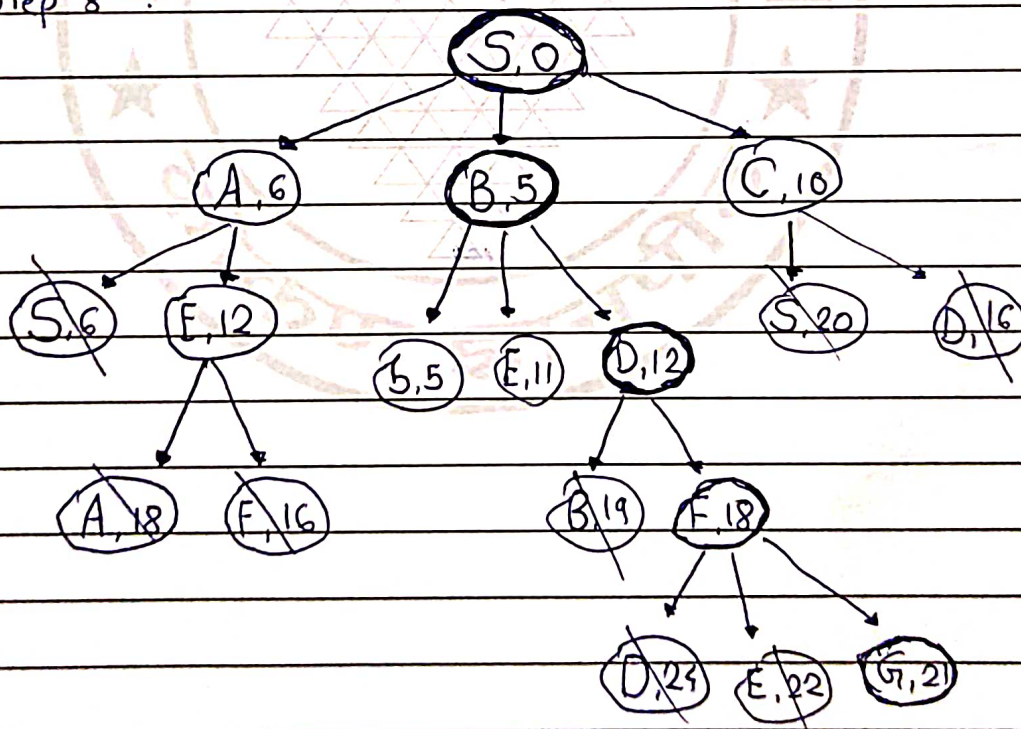
Step 6 :



Step 7



Step 8 :



1.4]

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

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

(S, 17)

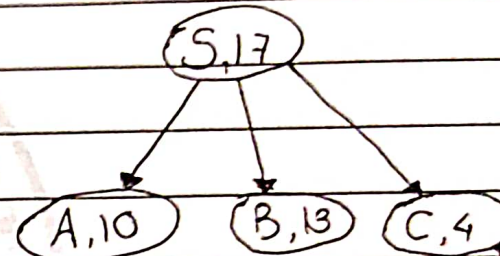
Step 1 :

F-score of Successors

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

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

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



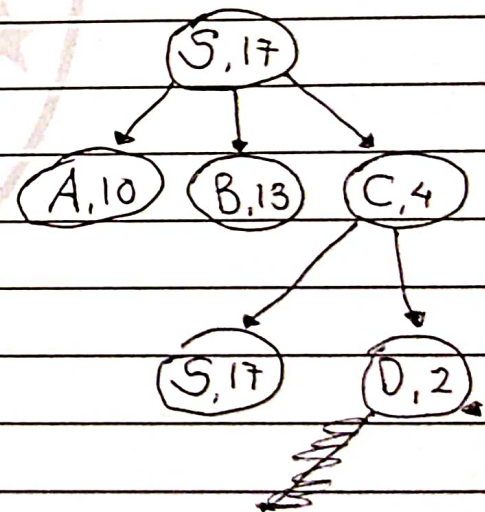
Step 2 :

F-score of Successor

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

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

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



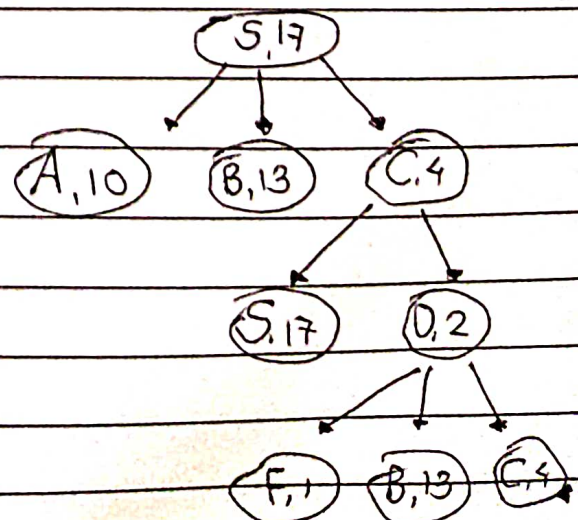
Step 3 :

F-score of Successor

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

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

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



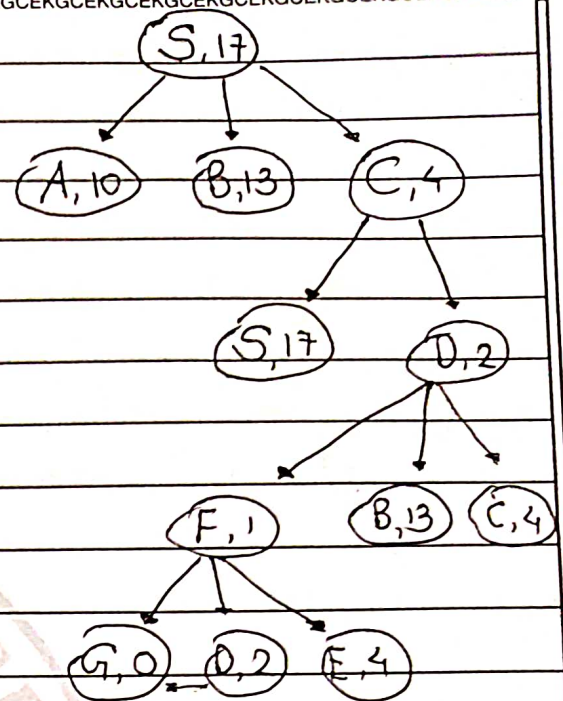
Step 4 :

F-score of Successor

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

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

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

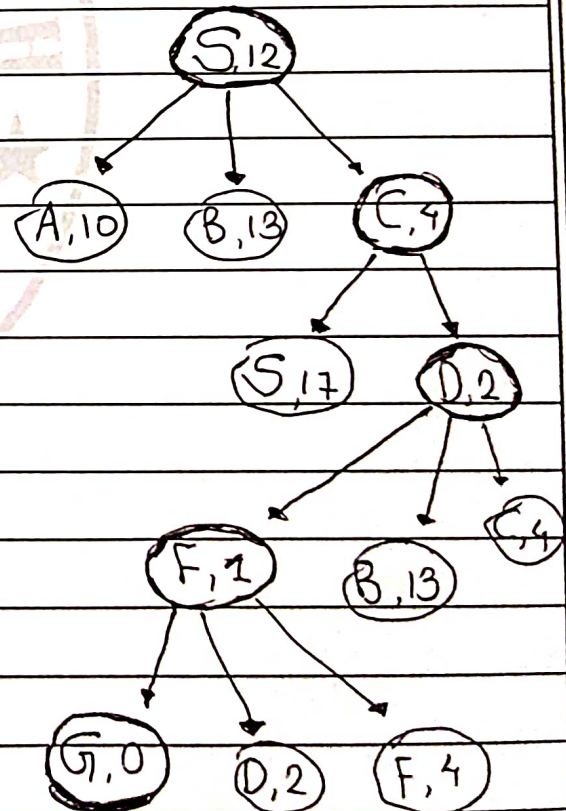


Step 5 :

Solution is

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

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 the 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
-1	3	4

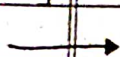
Solution can be represented as

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

Since all the moves are equally costly the cost would be

$$g(n) = 6$$

a



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		3	4	5

Left

Up

Right

Up

Left

down

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

Left

Down

8	-	7		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 $i = 2$, $n = \text{initial state}$

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

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

for $n = \text{goal state}$

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

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

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

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

for $n = \text{goal state}$

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