Assignment - 1A

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Class: BE

Branch - IT

Sub: IS lab

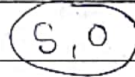Rollno: 67

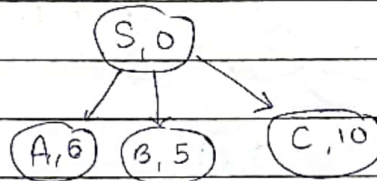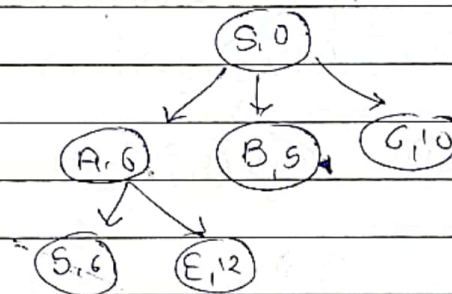|	O.O.P	O.O.A	Sign	Marks	

Q1.

1·1] →

Step 0:

(S,0)

Step 1:

(S,0) → (A,6) (B,5) (C,10)

Step 2:

(S,0) → (A,6) (B,5) (C,10)

(A,6) → (S,6) (E,12)

Step 3:-

(S,0) → (A,6) (B,5) (C,10)

(A,6) → (S̶,6̶) (E,12)

(B,5) → (E,11) (D,2)

(S,5)

Step 4

(S,0) → (A,6) (B,5) (C,10)

(A,6) → (S̶,6̶) (E,12)

(B,5) → (S,5) (A,11) (D,2)

(C,10) → (S,20) (D,16)
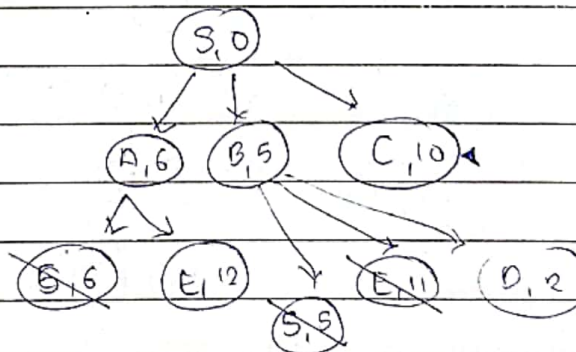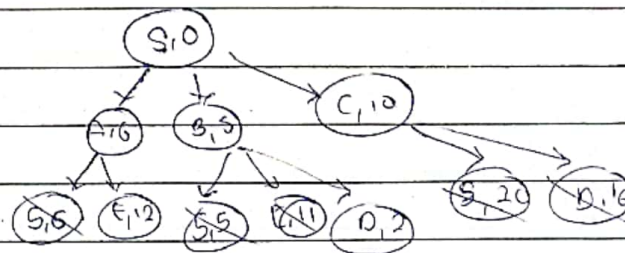
Step 5:
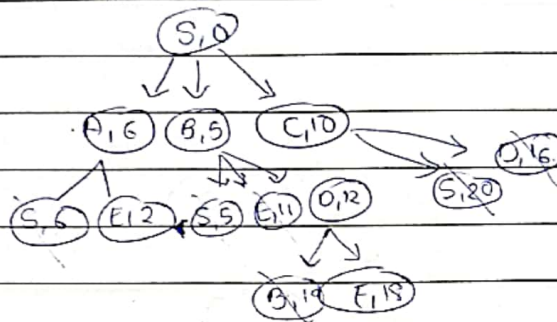
Step 6:

Step 7:

Step 8:
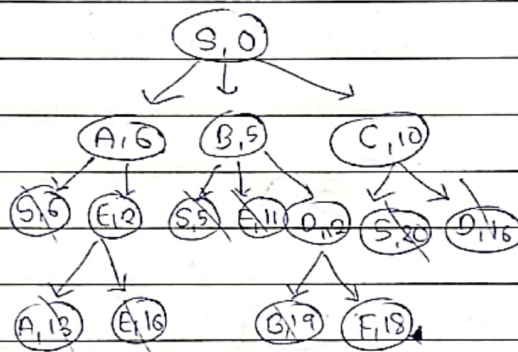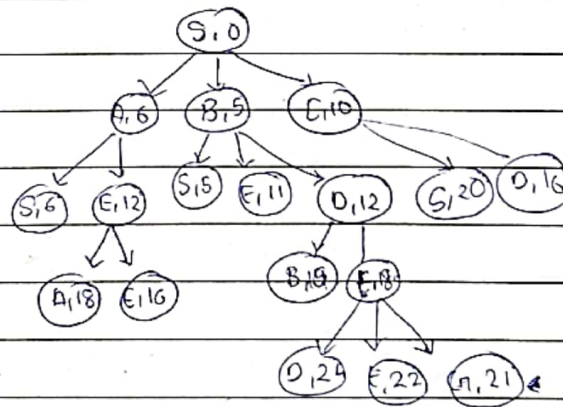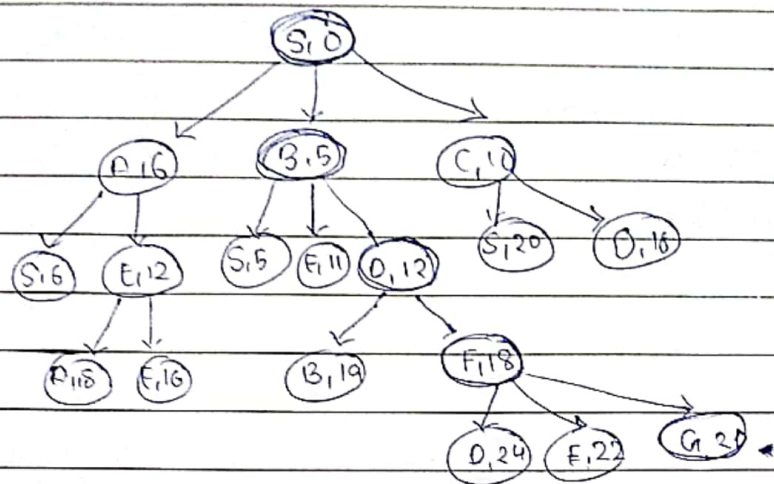
1.4.

→ Initialization : Compute and score for S & put it in the openlist.

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

Step 1.
F - score of successors
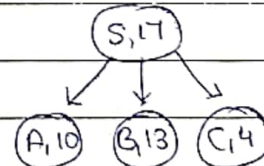$f(A) = h(A) = 10$
$f(B) = h(B) = 13$
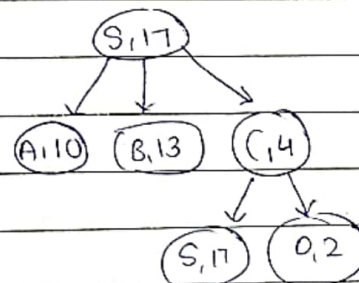$f(C) = h(C) = 4$

Step 2:
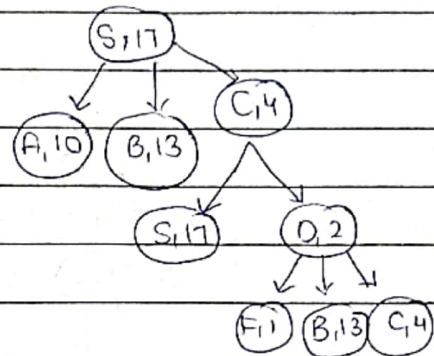F - score of successors
$f(S) = h(S) = 17$
$f(Q) = h(Q) = 2$

Step 3:

F- score of successor
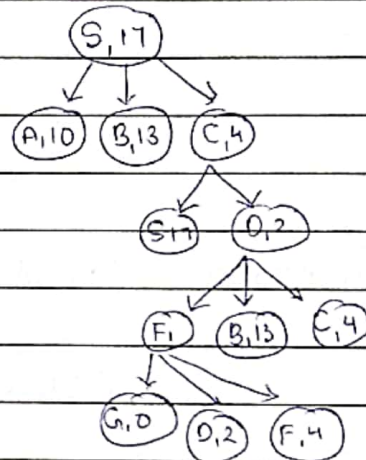
$f(C) = h(C) = 4$

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

Step 4:

F - score of successor
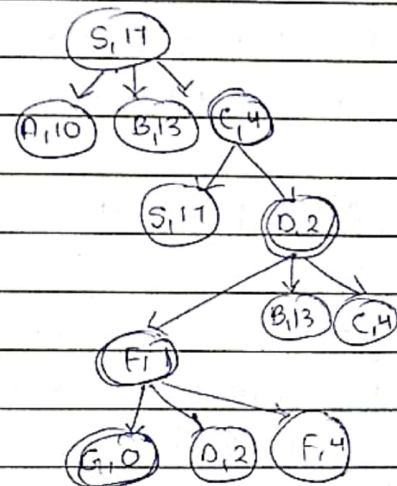
$f(0) = h(0) = 2$

$f(E) = n(E) = 4$

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

Step 5:

Solution is -

$S \to C \to 0 \to F \to G$ with

Sol^n cost = $10 + 6 + 6 + 3$

$= 25$

Q 2)

a)

→ The lowest path cost g(n) can be the cost to reach the goal config in least steps.

In our case, we can reach the final configuration in at last 4 moves : up, up, left, left

Since all throws 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 :

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

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

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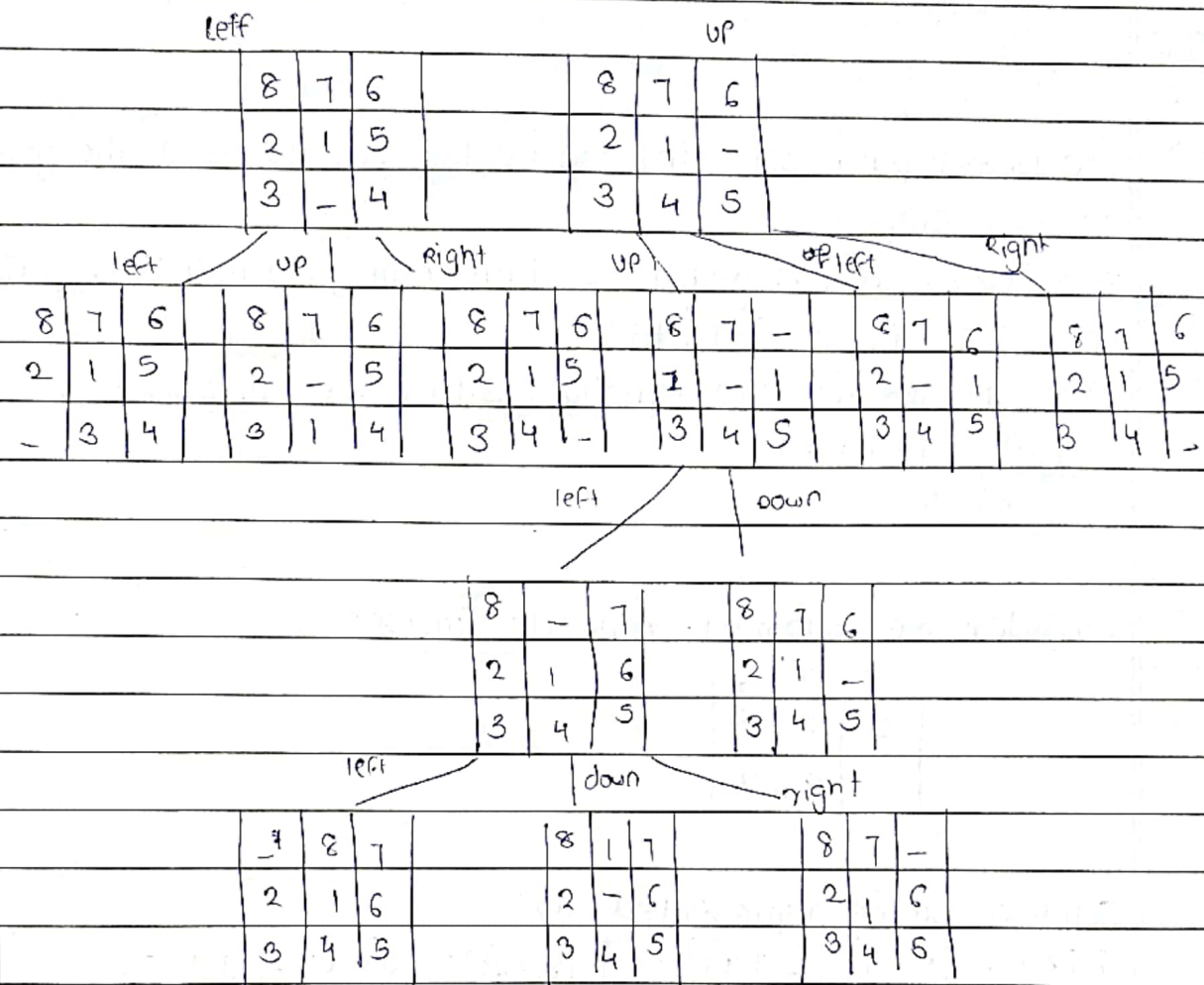
$\{ \{-,8,7\} \{2,1,6\} \{3,4,5\} \}$

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

c)

8	7	G
2	1	5
3	4	-

Initial config

left

8	7	6
2	1	5
3	-	4

up

8	7	6
2	1	-
3	4	5

left

8	7	6
2	1	5
-	3	4

up

8	7	6
2	-	5
3	1	4

right

8	7	6
2	1	5
3	4	-

up

8	7	-
2	-	1
3	4	5

up left

6	7	6
2	-	1
3	4	5

right

8	7	6
2	1	5
3	4	-

left

8	-	7
2	1	6
3	4	5

down

8	7	6
2	1	-
3	4	5

left

-	8	7
2	1	6
3	4	5

down

8	1	7
2	-	6
3	4	5

right

8	7	-
2	1	6
3	4	5

Final configuration

e)

→ For i=1, n= initial state

h_1(initial) = Misplaced tikes count except space

h_1(initial) = 4

n= goal state

h_1(goal) = 0

For i=2, n= initial state

$h_2 (initial)$ = directly replaced tiles count except space

$h_2 (initial) = 4$

for n = goal state

$h_2 (goal) = 8$

For $i = 3$, n = initial state

$h_3 (initial)$ = sum of manhattan distance between
current and correct position of all tiles except
space

$h_3 (initial) = 0+0+0+0+1+1+1+1$

$= 4$

For n = goal state

$h_3 (goal) = 0.$