K.G.C.E.
Karjat - Raigad

Page No.:

Date :

KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE

Name :- Rahul Ravindra Shinde.

Roll No. :- 64

class :- BE - IT

subject :- IS Lab

sem :- VII

DOP	DOC	Mark	Sign

Q.2 Consider following of 8 puzzle problem:

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

Initial confi.   Goal config.

- Consider Hueristic functions define below:

- h1 : Misplaced tiles count except space
- h2 : Correctly placed tiles count except space
- h3 : Sum of Manhattan distance between current and correct position of all times except space.

- Answer following questions :—

a. In 8 puzzle problem we are concerned with getting to goal configuration within least number of steps. All moves are thus equally costly. Define $g(n)$ in you own words. what will be the cost of 6 step solution to some arbitary 8 puzzle instance?

K.G.C.E.
Karjat - Raigad

Page No. :

Date :

KGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCEKGCE

→ - The lowest path of $g(n)$ can be the cost to reach the goal configuration in least steps.

- In case we can reach the final configuration in atleast four move: UP, UP, LEFT, LEFT

- Since all the moves are equally costly, we compute $g(n)$ as
$g(n) = 1+1+1+1$
$g(n) = 4$

- consider the following arbitrary 8 puzzle instance which since solution in 6 steps.

8	7	6
2	1	5
-	3	4

- The solution can be represent as:
$\{\{8,7,6\}, \{2,1,5\}, \{-,3,4\}\} \rightarrow$
$\{\{8,7,6\}, \{2,1,5\}, \{3,-,4\}\} \rightarrow$
$\{\{8,7,6\}, \{2,1,5\}, \{3,4,-\}\} \rightarrow$
$\{\{8,7,6\}, \{2,1,-\}, \{3,4,5\}\} \rightarrow$
$\{\{8,7,-\}, \{2,1,6\}, \{3,4,5\}\} \rightarrow$
$\{\{8,-,7\}, \{2,1,6\}, \{3,4,5\}\} \rightarrow$
$\{\{-,8,7\}, \{2,1,6\}, \{3,4,5\}\}$

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

K.G.C.E.
Karjat - Raigad
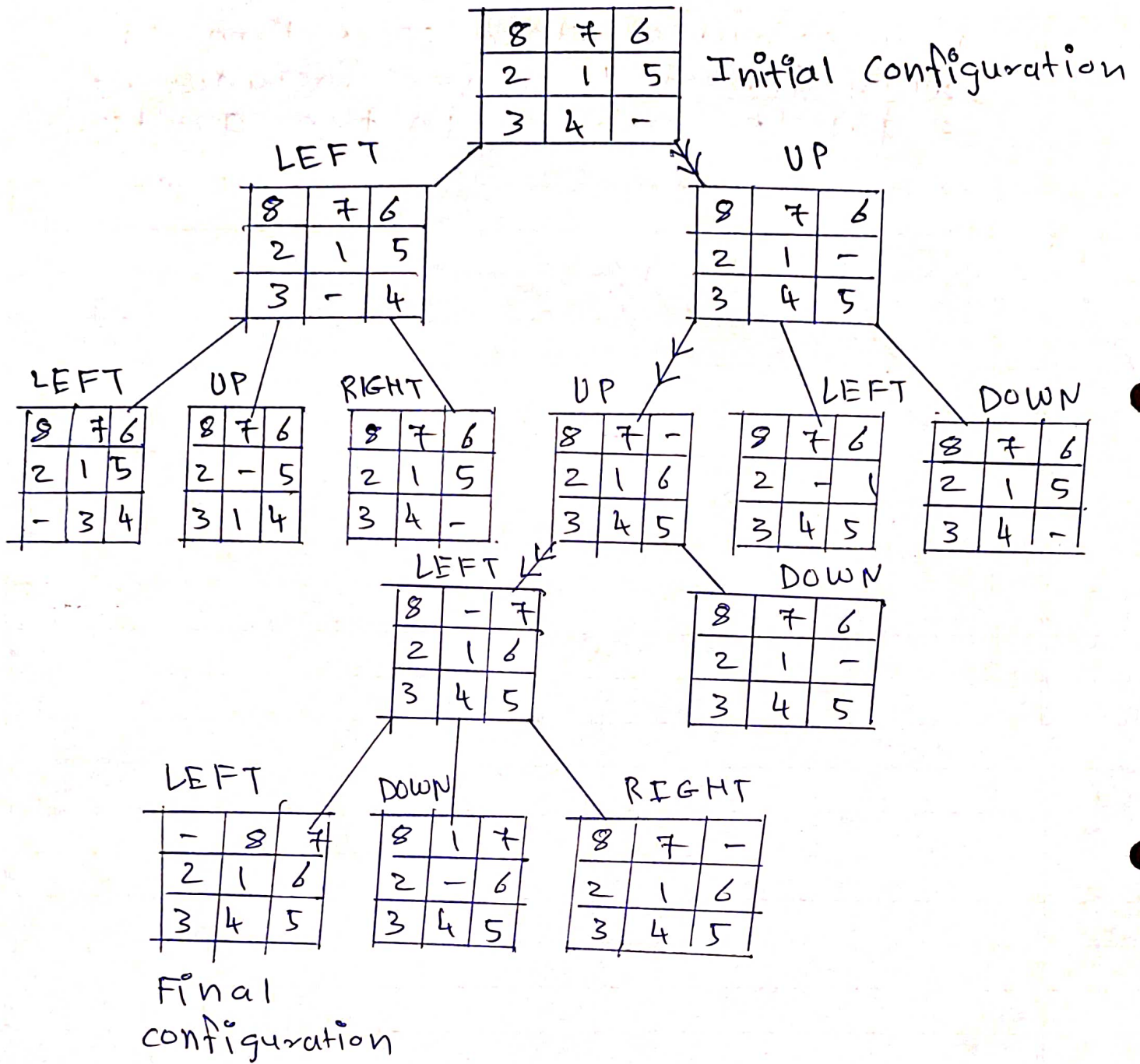
Page No.:

Date :

KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE KGCE

Q.2   c | Draw exhastise state space tree of
depth limited to 4 for instance of
8 puzzle problem in the question

Ans (c) =>

Initial configuration

8	7	6
2	1	5
3	4	-

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	6
3	4	5

LEFT

9	7	6
2	-	1
3	4	5

DOWN

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) Compute $h_i(n)$ where $i = 1, 2, 3$ and $n = $ initial state, goal state from question.

$\Rightarrow$ For $i = 1$, $n = $ initial state
h_1 (initial) = Misplaced files count except space
h_1 (initial) = 4

$n = $ goal state
$h_1 = $ (goal = 0

For $i = 2$, $n = $ initial state
h_2 (initial) = correctly placed files 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 count position of all times except space
h_3 (initial) = 0 + 0 + 0 + 1 + 1 + 1 + 1
= 4
For $n = $ Goal state
h_3 (goal) = 0