

ASSIGNMENT OF ARTIFICIAL
INTELLIGENCE

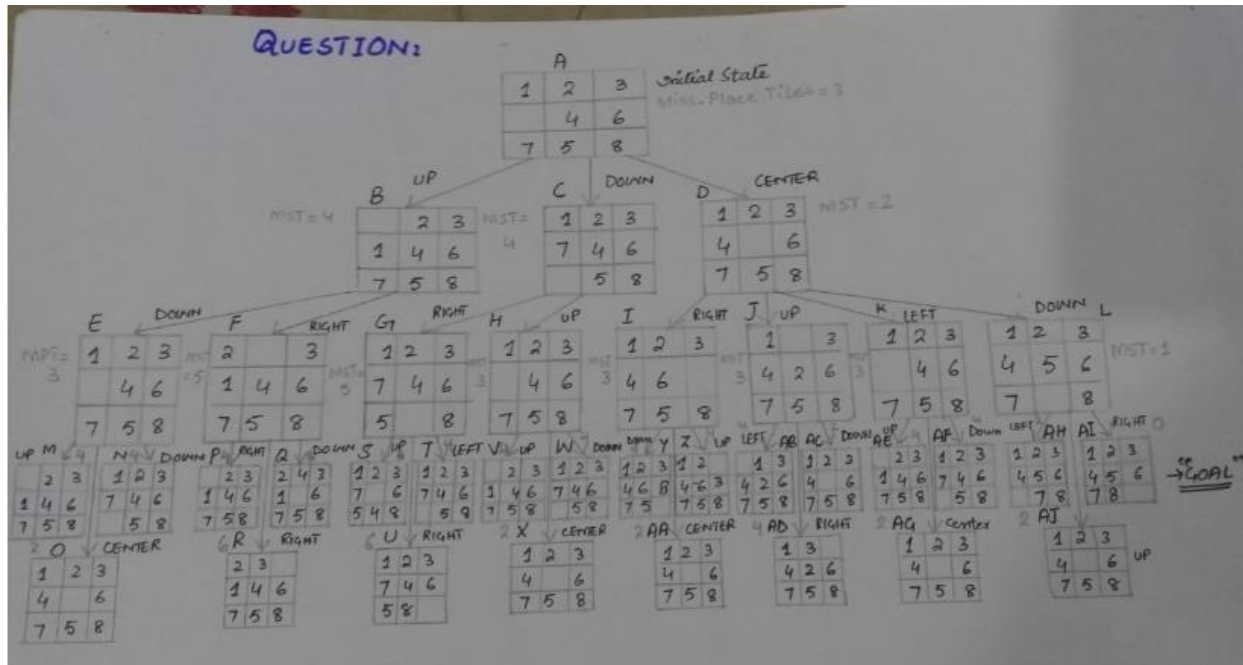
NAME: JAWERIA ASIF

COURSE ID: 103778

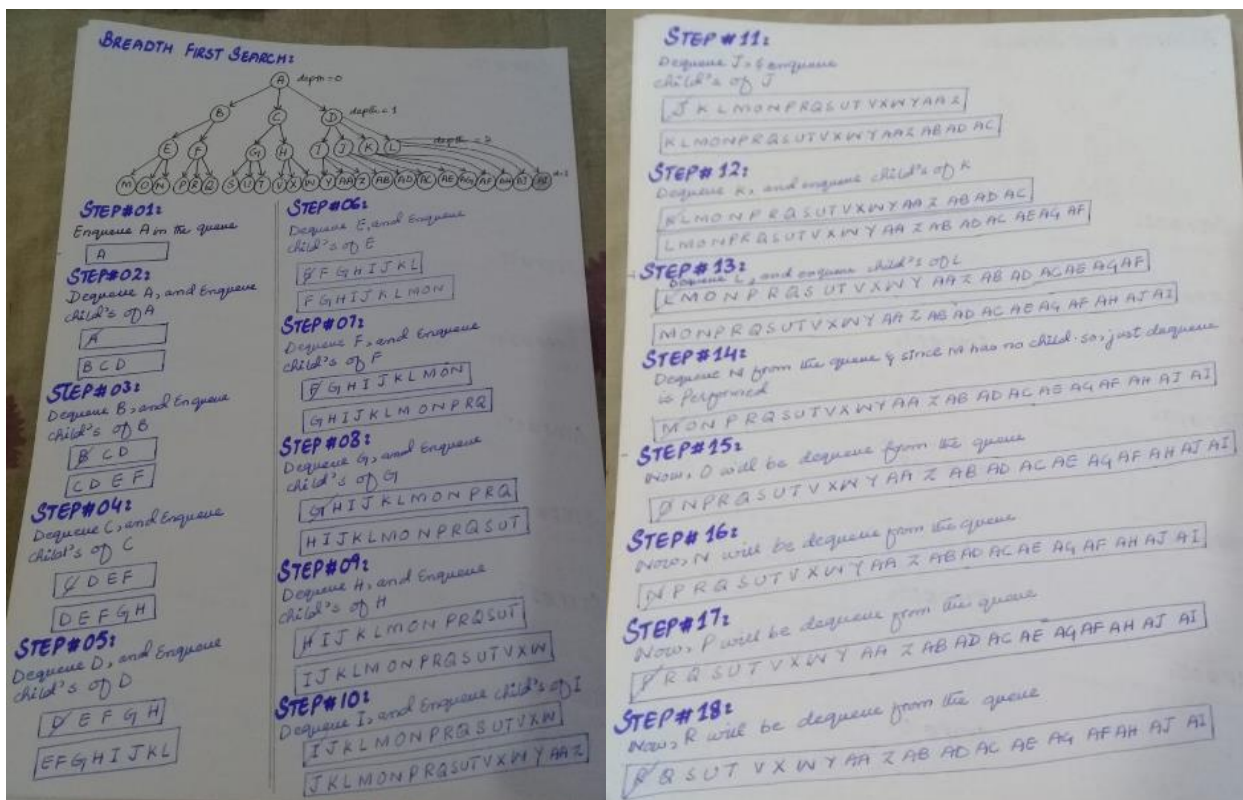
SUBMITTED BY: JAWERIA ASIF

SUBMITTED TO: MAM UMEMA HANI

QUESTION: Initial state



BREADTH FIRST SEARCH ALGORITHM:



(A)

(B)

STEP#19:
Now, dequeue Q from the queue
Q E U T V A R Y A A Z AB AD AC AE AH AF AH AJ AI

STEP#20:
Now, dequeue S from the queue
S U T V X W Y A A Z AB AD AC AE AG AF AH AJ AI

STEP#21:
Now, dequeue U from the queue
U T V X W Y A A Z AB AD AC AE AG AF AH AJ AI

STEP#22:
Now, dequeue T from the queue
T V X W Y A A Z AB AD AC AE AG AF AH AJ AI

STEP#23:
Now, dequeue V from the queue
V X W Y A A Z AB AD AC AE AG AF AH AJ AI

STEP#24:
Now, dequeue X from the queue
X W Y A A Z AB AD AC AE AG AF AH AJ AI

STEP#25:
Now, dequeue W from the queue
W Y A A Z AB AD AC AE AG AF AH AJ AI

STEP#26:
Now, dequeue Y from the queue
Y A A Z AB AD AC AE AG AF AH AJ AI

STEP#27:
Now, dequeue A from the queue
A A Z AB AD AC AE AG AF AH AJ AI

STEP#28:
Now, dequeue Z from the queue
Z AB AD AC AE AG AF AH AJ AI

(C)

STEP#29:
Now, dequeue AB from the queue
AB AD AC AE AG AF AH AJ AI

STEP#30:
Now, dequeue AD from the queue
AD AC AE AG AF AH AJ AI

STEP#31:
Now, dequeue AC from the queue
AC AE AG AF AH AJ AI

STEP#32:
Now, dequeue AE from the queue
AE AG AF AH AJ AI

STEP#33:
Now, dequeue AG from the queue
AG AF AH AJ AI

STEP#34:
Now, dequeue AF from the queue
AF AH AJ AI

STEP#35:
Now, dequeue AH from the queue
AH AJ AI

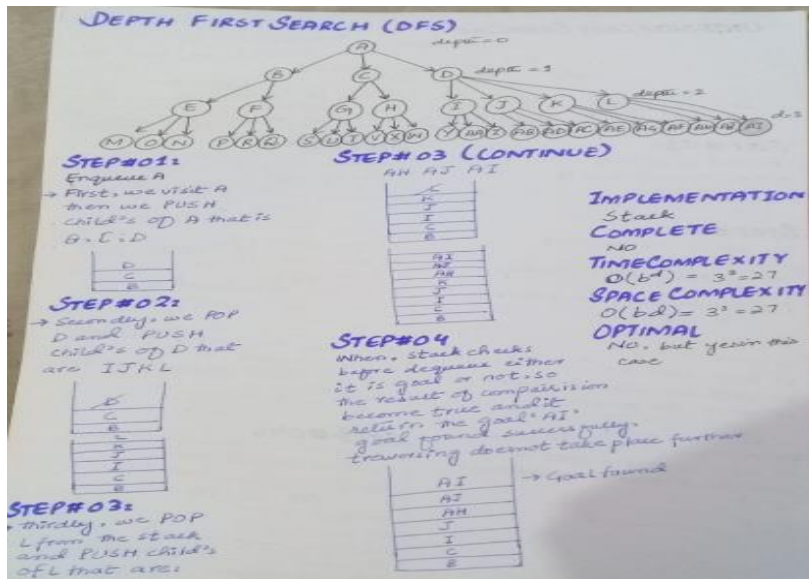
STEP#36:
Now, dequeue AJ from the queue
AJ, AI

STEP#37:
Now, when it reach to AI, the goal is reached
AI
"Goal Reached Successfully"

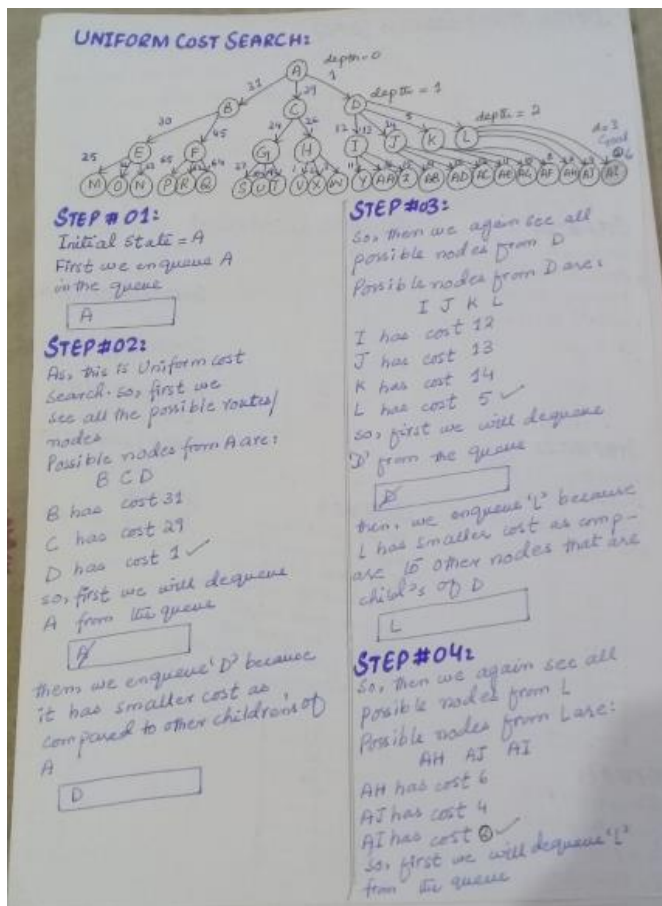
IMPLEMENTATION
Queue
COMPLETE
Yes
TIME COMPLEXITY
 $O(b^d) = 3^3 = 27$
SPACE COMPLEXITY
 $O(b^d) = 3^3 = 27$
OPTIMAL
Yes, it is optimal
but in this case
we have to traverse
all the nodes, but in
the end we find goal

(D)

DEPTH FIRST SEARCH ALGORITHM:



UNIFORM COST SEARCH ALGORITHM:



then, we enqueue AI
because, AI has smaller
cost than other children
of 'L'

AI

And when our conditions
check goal has been found
or not, the condition become
true & the algorithm returns
goal found successfully

IMPLEMENTATION:

Priority Queue
COMPLETE:

Yes

TIME COMPLEXITY
 $O(b^{\frac{1+C}{E}}) = 3^{\frac{1+6}{E}}$

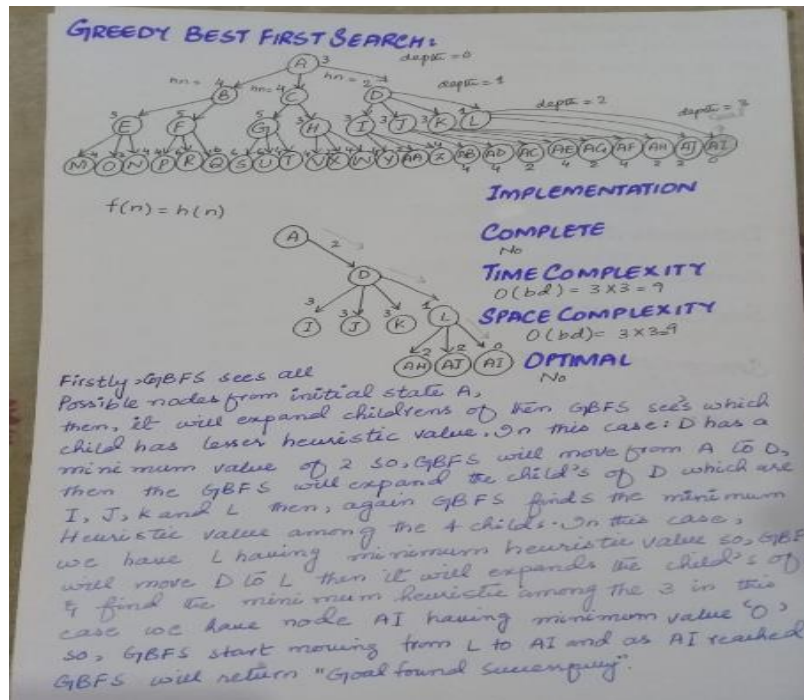
SPACE COMPLEXITY
 $O(b^{\frac{1+C^*}{E}}) = 3^{\frac{1+6}{E}}$

OPTIMAL

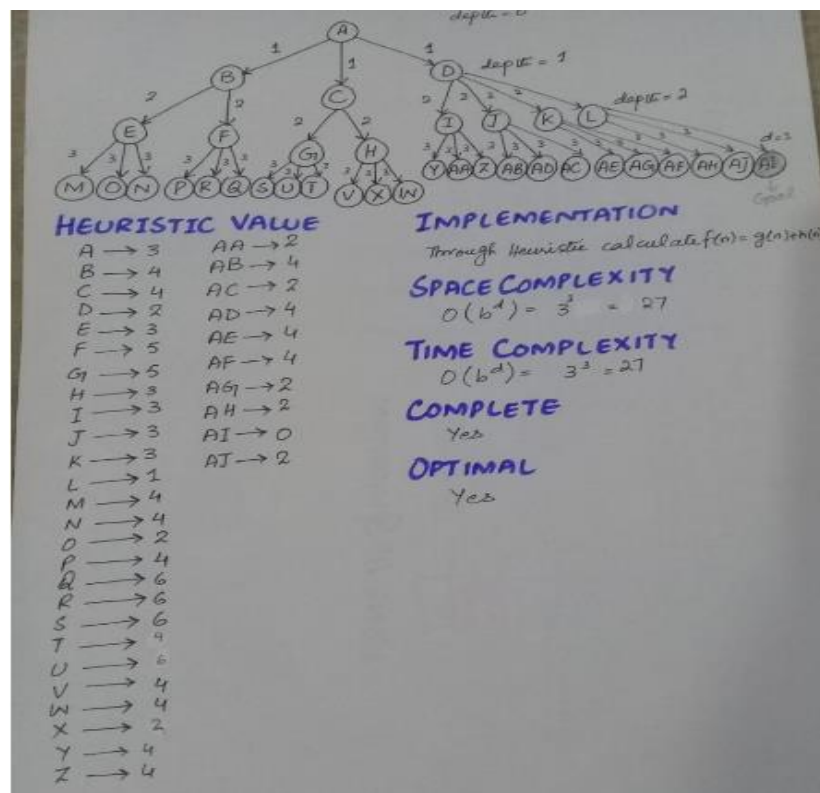
Yes

Order of visit A, D, L, AI

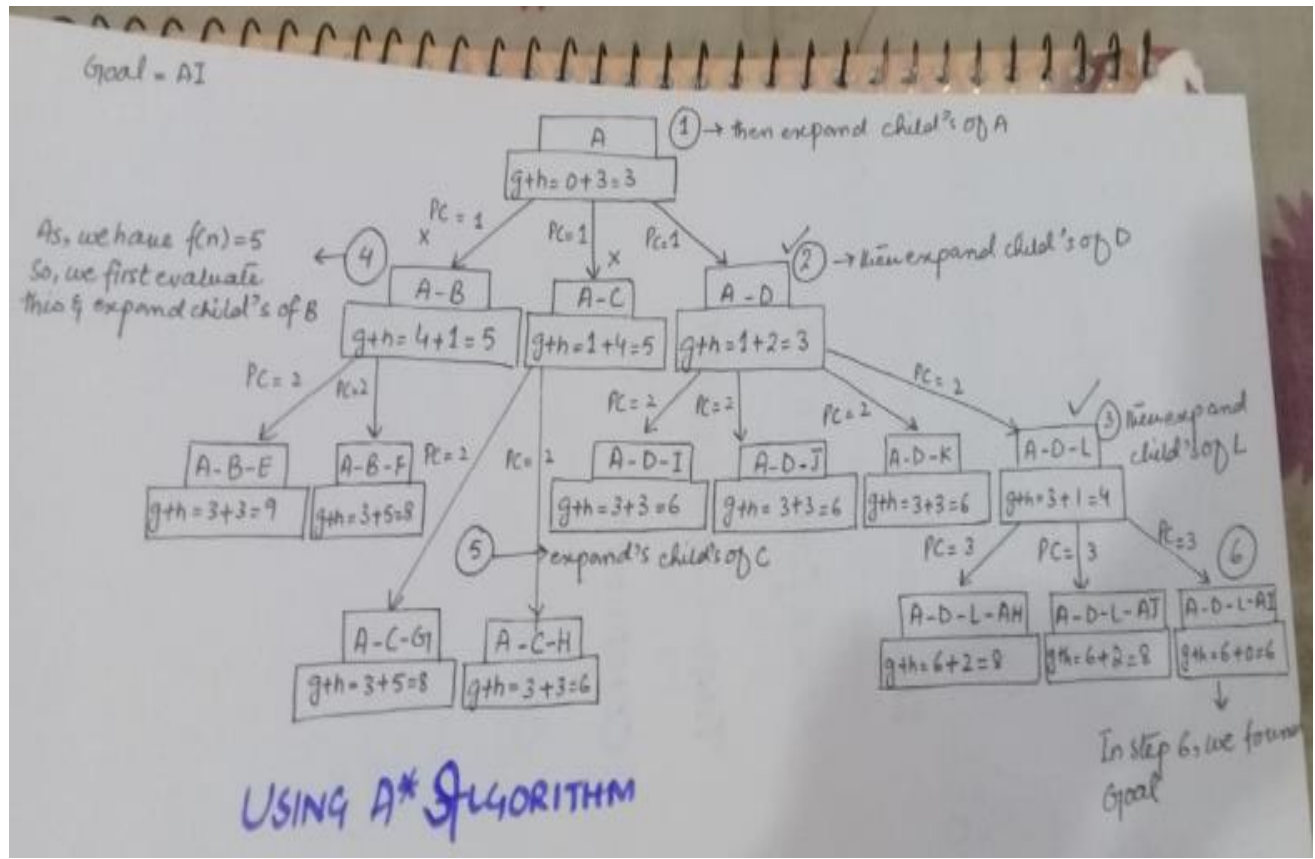
GREEDY BEST FIRST SEARCH ALGORITHM:



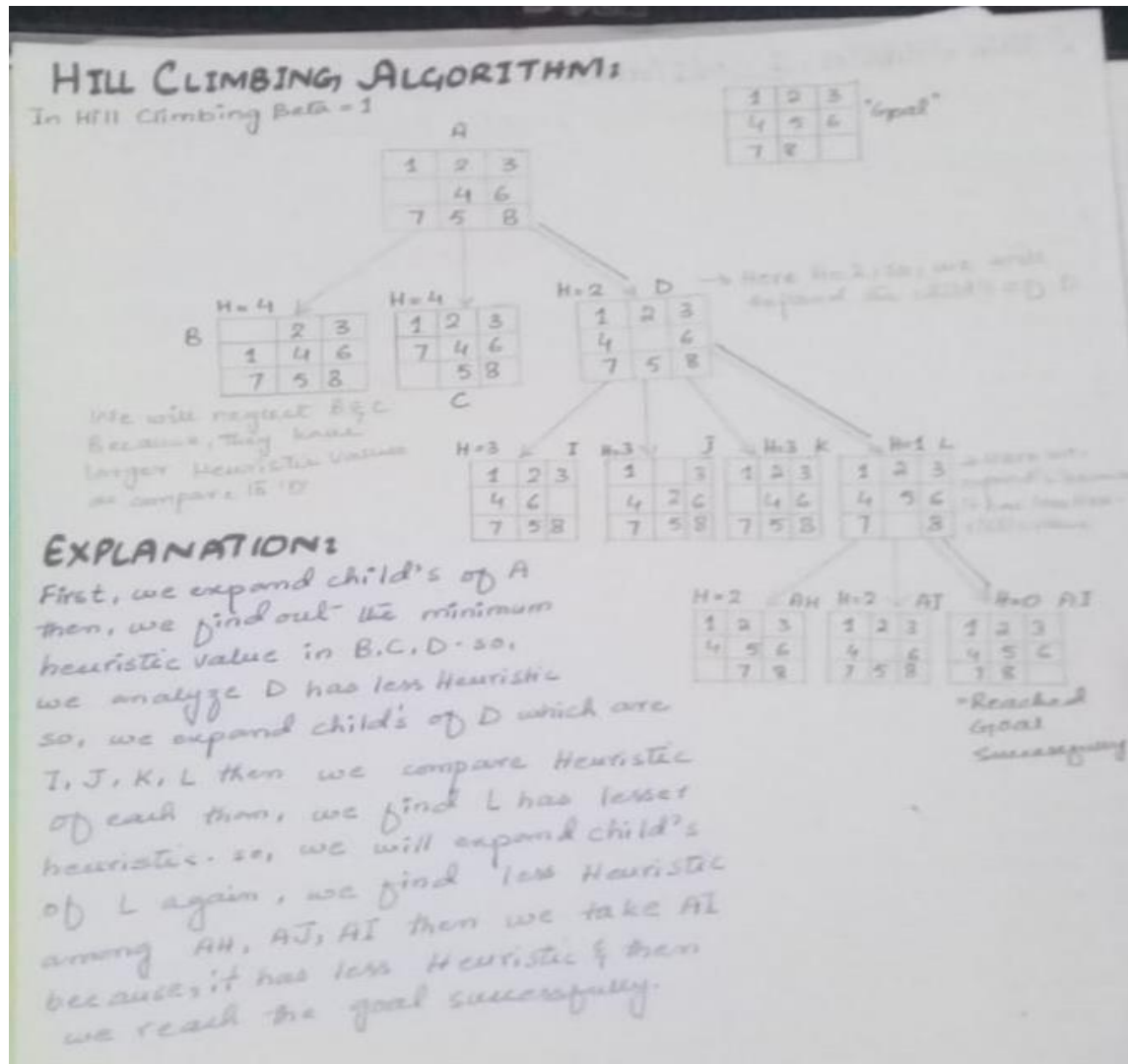
A* SEARCH ALGORITHM:



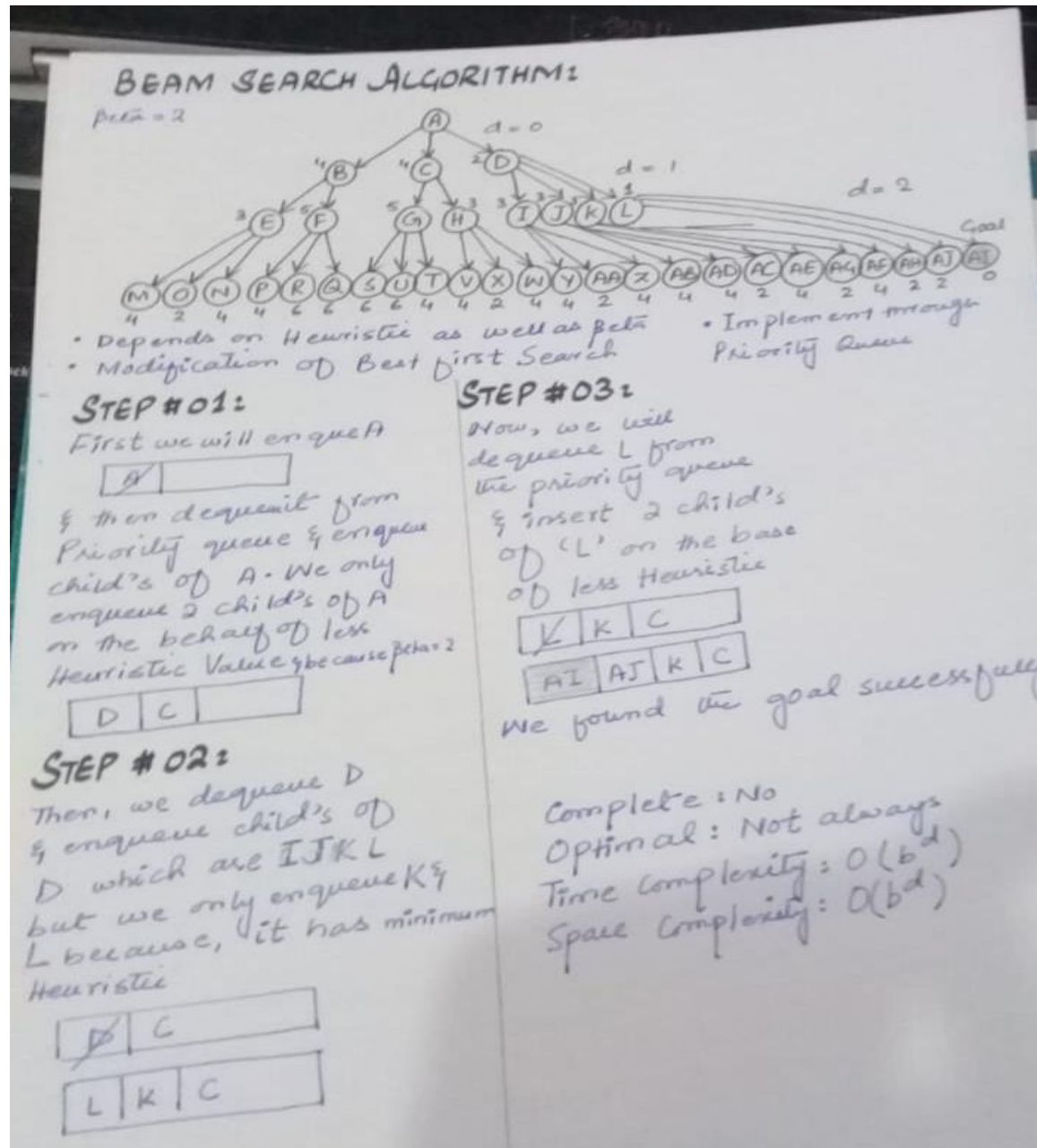
IMPLEMENTATION OF A* BY CALCULATING G(N):



IMPLEMENTATION OF HILL CLIMBING (LOCAL SEARCH):



IMPLEMENTATION OF BEAM SEARCH ALGORITHM:



IMPLEMENTATION OF GENETIC ALGORITHM:

GENETIC ALGORITHM:

1	2	3
	4	6
7	5	8

Initial State

1	2	3
4	5	6
7	8	

Goal

Parent 1

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

Parent 2

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

Initial state Population:
 Number of misplaced tiles = 4

Tile	Index	Possible moves
4	3	[U, R, D]
5	4	[R, L, U, D]
8	3	[U, L, R]
9	2	[U, L]

Population = 12

Chromosome:

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

Mutation:

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

 → Before Mutation

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

 → After Mutation

Fitness Function: $\sum_{i=1}^9 n * i$ [n = tiles value, i index of tiles]

Initial State

FF = [(1x1) + (2x2) + (3x3) + (4x4) + (4x5) + (6x6) + (7x7) + (5x8) + (8x9)]

FF = 225