AI LAB PROGRAMS AND OUTPUTS

1.Write the python program to solve 8-Puzzle problem

import copy

from heapq import heappush, heappop

n = 3

row = [ 1, 0, -1, 0 ]

col = [ 0, -1, 0, 1 ]

class priorityQueue:

def \_\_init\_\_(self):

self.heap = []

def push(self, k):

heappush(self.heap, k)

def pop(self):

return heappop(self.heap)

def empty(self):

if not self.heap:

return True

else:

return False

class node:

def \_\_init\_\_(self, parent, mat, empty\_tile\_pos,

cost, level):

self.parent = parent

self.mat = mat

self.empty\_tile\_pos = empty\_tile\_pos

self.cost = cost

self.level = level

def \_\_lt\_\_(self, nxt):

return self.cost < nxt.cost

def calculateCost(mat, final) -> int:

count = 0

for i in range(n):

for j in range(n):

if ((mat[i][j]) and

(mat[i][j] != final[i][j])):

count += 1

return count

def newNode(mat, empty\_tile\_pos, new\_empty\_tile\_pos,

level, parent, final) -> node:

new\_mat = copy.deepcopy(mat)

x1 = empty\_tile\_pos[0]

y1 = empty\_tile\_pos[1]

x2 = new\_empty\_tile\_pos[0]

y2 = new\_empty\_tile\_pos[1]

new\_mat[x1][y1], new\_mat[x2][y2] = new\_mat[x2][y2], new\_mat[x1][y1]

cost = calculateCost(new\_mat, final)

new\_node = node(parent, new\_mat, new\_empty\_tile\_pos,

cost, level)

return new\_node

def printMatrix(mat):

for i in range(n):

for j in range(n):

print("%d " % (mat[i][j]), end = " ")

print()

def isSafe(x, y):

return x >= 0 and x < n and y >= 0 and y < n

def printPath(root):

if root == None:

return

printPath(root.parent)

printMatrix(root.mat)

print()

def solve(initial, empty\_tile\_pos, final):

pq = priorityQueue()

cost = calculateCost(initial, final)

root = node(None, initial,

empty\_tile\_pos, cost, 0)

pq.push(root)

while not pq.empty():

minimum = pq.pop()

if minimum.cost == 0:

printPath(minimum)

return

for i in range(4):

new\_tile\_pos = [

minimum.empty\_tile\_pos[0] + row[i],

minimum.empty\_tile\_pos[1] + col[i], ]

if isSafe(new\_tile\_pos[0], new\_tile\_pos[1]):

child = newNode(minimum.mat,

minimum.empty\_tile\_pos,

new\_tile\_pos,

minimum.level + 1,

minimum, final,)

pq.push(child)

initial = [ [ 1, 2, 3 ],

[ 5, 6, 0 ],

[ 7, 8, 4 ] ]

final = [ [ 1, 2, 3 ],

[ 5, 8, 6 ],

[ 0, 7, 4 ] ]

empty\_tile\_pos = [ 1, 2 ]

solve(initial, empty\_tile\_pos, final)

out put;

