PROGRAM TITLE-5

Missionaries Cannibal problem

AIM:

To write and execute the python program for Missionaries Cannibal problem.

PROCEDURE:

- Initialization:
  Define the initial state and the goal state.
  Initialize the open list with the initial state.
- While the open list is not empty:
  Choose the node with the lowest total cost from the open list. This cost is the sum of the path cost from the initial state and the estimated cost to the goal state (heuristic function).
  If the chosen node is the goal state, the solution is found, and the algorithm terminates.
- Generate successors:
  Expand the chosen node by generating its successor states. These are the possible states that can be reached by moving a tile (up, down, left, or right).
  For each successor, calculate its cost and add it to the open list if it is not already there.
  Update the cost if a better path to that state is found.
- Update the open and closed lists:
  Move the chosen node from the open list to the closed list to mark it as processed.
- Repeat:
  Continue the process until the goal state is reached or the open list is empty.
- Backtrack for solution:
  If a solution is found, backtrack from the goal state to the initial state to obtain the sequence of moves.

CODING:

```
#Python program to illustrate Missionaries & cannibals Problem

#This code is contributed by Sunit Mal

print("\n")

print("\tGame Start\nNow the task is to move all of them to right side of the river")

print("rules:\n1. The boat can carry at most two people\n2. If cannibals num greater than missionaries then the cannibals would eat the missionaries\n3. The boat cannot cross the river by itself with no people on board")

lM = 3          #lM = Left side Missionaries number

lC = 3          #lC = Laft side Cannibals number

rM=0            #rM = Right side Missionaries number

rC=0            #rC = Right side cannibals number

userM = 0       #userM = User input for number of missionaries for right to left side travel
```

```
userC = 0          #userC = User input for number of cannibals for right to left travel
k = 0
print("\nM M M C C C |  --- | \n")
try:
        while(True):
                while(True):
                        print("Left side -> right side river travel")
                        #uM = user input for number of missionaries for left to right travel
                        #uC = user input for number of cannibals for left to right travel
                        uM = int(input("Enter number of Missionaries travel => "))
                        uC = int(input("Enter number of Cannibals travel => "))

                        if((uM==0)and(uC==0)):
                                print("Empty travel not possible")
                                print("Re-enter : ")
                        elif(((uM+uC) <= 2)and((lM-uM)>=0)and((lC-uC)>=0)):
                                break
                        else:
                                print("Wrong input re-enter : ")
                lM = (lM-uM)
                lC = (lC-uC)
                rM += uM
                rC += uC

                print("\n")
                for i in range(0,lM):
                        print("M ",end="")
                for i in range(0,lC):
                        print("C ",end="")
                print("| --> | ",end="")
                for i in range(0,rM):
```

```
                print("M ",end="")
        for i in range(0,rC):
                print("C ",end="")
        print("\n")

        k +=1

        if(((lC==3)and (lM == 1))or((lC==3)and(lM==2))or((lC==2)and(lM==1))or((rC==3)and
(rM == 1))or((rC==3)and(rM==2))or((rC==2)and(rM==1))):
                print("Cannibals eat missionaries:\nYou lost the game")

                break

        if((rM+rC) == 6):
                print("You won the game : \n\tCongrats")
                print("Total attempt")
                print(k)
                break
        while(True):
                print("Right side -> Left side river travel")
                userM = int(input("Enter number of Missionaries travel => "))
                userC = int(input("Enter number of Cannibals travel => "))

                if((userM==0)and(userC==0)):
                                print("Empty travel not possible")
                                print("Re-enter : ")
                elif(((userM+userC) <= 2)and((rM-userM)>=0)and((rC-userC)>=0)):
                        break
                else:
                        print("Wrong input re-enter : ")
        lM += userM
```

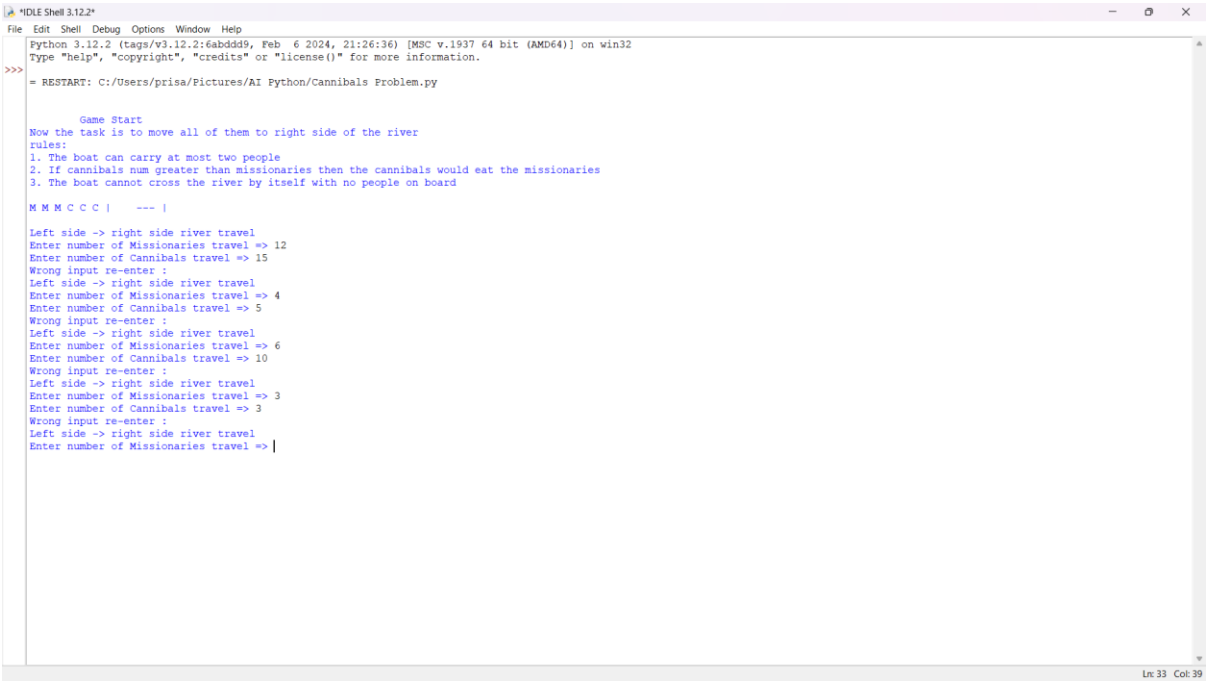
```
                lC += userC
                rM -= userM
                rC -= userC

                k +=1
                print("\n")
                for i in range(0,lM):
                        print("M ",end="")
                for i in range(0,lC):
                        print("C ",end="")
                print("| <-- | ",end="")
                for i in range(0,rM):
                        print("M ",end="")
                for i in range(0,rC):
                        print("C ",end="")
                print("\n")



                if(((lC==3)and (lM == 1))or((lC==3)and(lM==2))or((lC==2)and(lM==1))or((rC==3)and
(rM == 1))or((rC==3)and(rM==2))or((rC==2)and(rM==1))):
                        print("Cannibals eat missionaries:\nYou lost the game")
                        break
except EOFError as e:
        print("\nInvalid input please retry !!")
```

OUTPUT:



RESULT:

Thus the output has been successfully written and verified.