PROGRAM TITLE 5

MISSIONARY AND CANNIBAL PROBLEM

AIM:

To write a python program to solve missionary and canibal problem.

PROCEDURE:

1. State Representation:

Define a data structure to represent the current state of the problem. In this case, the state should include the number of missionaries and cannibals on each side of the river, as well as the position of the boat.

2. Define Valid Moves:

Identify and define the valid moves that can be performed in the problem. A move typically involves moving a certain number of missionaries and cannibals from one side of the river to the other. Ensure that the move is valid and doesn't violate any rules (e.g., having more cannibals than missionaries on either side).

3. Implement Depth-First Search (DFS):

• Use a DFS algorithm to explore all possible states of the problem. Start with the initial state and perform valid moves to generate new states. Keep track of visited states to avoid infinite loops.

4. Goal Test:

• Define a goal test to check whether the current state represents a valid solution to the problem. The goal is typically to move all missionaries and cannibals from one side of the river to the other.

5. Print or Output Solution:

• Once a solution is found, print or output the sequence of moves that lead to the goal state. You may also choose to print the intermediate states to show the progression of the solution.

CODING:

```
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
lC = 3
rM = 0
rC = 0
userM = 0
userC = 0
k = 0
print("\nM M M C C C |          --- | \n")
try:
    while (True):
        while (True):
            print("Left side -> right side river 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:

```
    Game Start
Now the task is to move all of them to right side of the river
rules:
1. The boat can carry at most two people
2. If cannibals num greater than missionaries then the cannibals would eat the m
3. The boat cannot cross the river by itself with no people on board

M M M C C C |    --- |

Left side -> right side river travel
Enter number of Missionaries travel => 1
Enter number of Cannibals travel => 1


M M C C | --> | M C

Right side -> Left side river travel
Enter number of Missionaries travel =>
```

RESULT:

Hence the program been successfully executed and verified.