ACD Lab ASSIGNMENT 3

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Section : CSE A

Roll no : 5

1 . Write a program to design a turing machine for a^nb^n-2 for n>=2

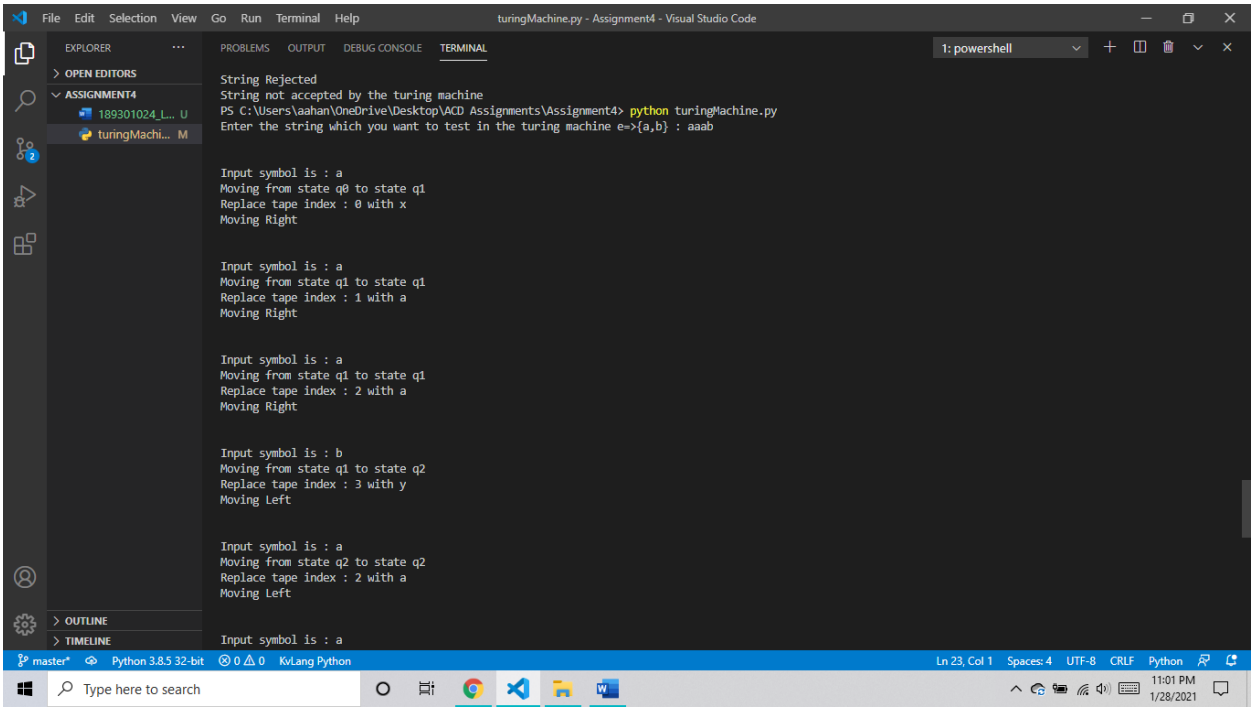
Sol :

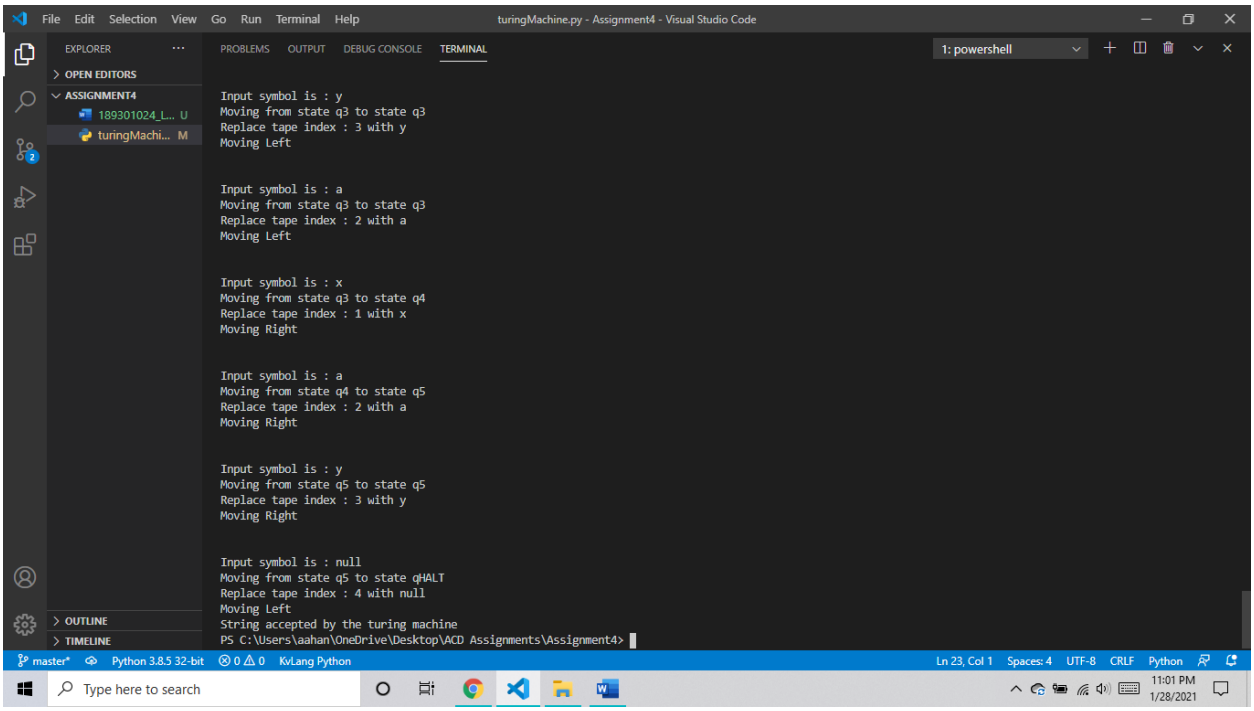
Code : (python)

```
#turing machine for a^nb^n-2 n>=2
symbolSet={'a','b','null','h'}
inpString=input('Enter the string which you want to test in the turing machine e=
>{a,b} : ')
tape=[]
tape.extend([char for char in inpString]+['null'])
curState=0
curTapeIndex=0
transitions={
    0:[('a','x','r',1)],
    1:[('a','a','r',1),('b','y','l',2),('null','null','l',3),('y','y','r',1)],
    2:[('a','a','l',2),('y','y','l',2),('x','x','r',0)],
    3:[('a','a','l',3),('y','y','l',3),('x','x','r',4)],
    4:[('a','a','r',5)],
    5:[('y','y','r',5),('null','null','l','HALT')],
    'HALT':[]
}
def MoveLeftOnTape():
    global curTapeIndex
    curTapeIndex-=1
def MoveRightOnTape():
    global curTapeIndex
    curTapeIndex+=1

def performTransitions(symbol):
    global curTapeIndex
    global curState
    transitionExists=False
    for tuple in transitions[curState]:
        if tuple[0]==symbol:
```

```
            transitionExists=True
            print('\n')
            print('Input symbol is : {} '.format(symbol))
            print('Moving from state q{} to state q{}'.format(curState,tuple[3]))
            print('Replace tape index : {} with {}'.format(curTapeIndex,tuple[1])
)
            curState=tuple[3]
            tape[curTapeIndex]=tuple[1]
            if tuple[2]=='l':
                MoveLeftOnTape()
                print('Moving Left')
            elif tuple[2]=='r':
                MoveRightOnTape()
                print('Moving Right')

            break
    return transitionExists

while(curState!='HALT'):
    transitionExists=performTransitions(tape[curTapeIndex])
    if not transitionExists:
        print('Transition doesnt exist for {} on {}'.format(tape[curTapeIndex],cu
rState))
        print('String Rejected')
        break

if curState=='HALT':
    print('String accepted by the turing machine')
else:
    print('String not accepted by the turing machine')
```

Output:


File Edit Selection View Go Run Terminal Help
turingMachine.py - Assignment4 - Visual Studio Code
EXPLORER
OPEN EDITORS
ASSIGNMENT4
189301024_L... U
turingMachi... M
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
1: powershell
String Rejected
String not accepted by the turing machine
PS C:\Users\aahan\OneDrive\Desktop\ACD Assignments\Assignment4> python turingMachine.py
Enter the string which you want to test in the turing machine e=>{a,b} : aaab
Input symbol is : a
Moving from state q0 to state q1
Replace tape index : 0 with x
Moving Right
Input symbol is : a
Moving from state q1 to state q1
Replace tape index : 1 with a
Moving Right
Input symbol is : a
Moving from state q1 to state q1
Replace tape index : 2 with a
Moving Right
Input symbol is : b
Moving from state q1 to state q2
Replace tape index : 3 with y
Moving Left
Input symbol is : a
Moving from state q2 to state q2
Replace tape index : 2 with a
Moving Left
Input symbol is : a
OUTLINE
TIMELINE
master* Python 3.8.5 32-bit 0 0 KvLang Python
Ln 23, Col 1 Spaces: 4 UTF-8 CRLF Python
Type here to search
11:01 PM
1/28/2021


File Edit Selection View Go Run Terminal Help
turingMachine.py - Assignment4 - Visual Studio Code
EXPLORER
OPEN EDITORS
ASSIGNMENT4
189301024_L... U
turingMachi... M
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
1: powershell
Input symbol is : y
Moving from state q3 to state q3
Replace tape index : 3 with y
Moving Left
Input symbol is : a
Moving from state q3 to state q3
Replace tape index : 2 with a
Moving Left
Input symbol is : x
Moving from state q3 to state q4
Replace tape index : 1 with x
Moving Right
Input symbol is : a
Moving from state q4 to state q5
Replace tape index : 2 with a
Moving Right
Input symbol is : y
Moving from state q5 to state q5
Replace tape index : 3 with y
Moving Right
Input symbol is : null
Moving from state q5 to state qHALT
Replace tape index : 4 with null
Moving Left
String accepted by the turing machine
PS C:\Users\aahan\OneDrive\Desktop\ACD Assignments\Assignment4>
OUTLINE
TIMELINE
master* Python 3.8.5 32-bit 0 0 KvLang Python
Ln 23, Col 1 Spaces: 4 UTF-8 CRLF Python
Type here to search
11:01 PM
1/28/2021