AIM:

To implement left factoring in python.

ALGORITHM:

- Create two empty lists, k and l ; k to store the LHS and RHS of the production as a whole, l to store the RHS of the production by splitting it at ‘ /’.
- Create an empty string n to store the common string in the production.
- Iterate through the list l and check if there is any common character in the list of values and add it to n.
- Print the production containing the common string followed by R to denote the following values.
- Use split function to split the values in list l at the common string.
- Finally, print the production from R to these values.

Python CODE

```
from itertools import takewhile
def groupby(ls):
    d = {}
    ls = [ y[0] for y in rules ]
    initial = list(set(ls))
    for y in initial:
        for i in rules:
            if i.startswith(y):
                if y not in d:
                    d[y] = []
                d[y].append(i)
    return d

def prefix(x):
    return len(set(x)) == 1


starting=""
rules=[]
common=[]
```

```
alphabetset=["A'","B'","C'","D'","E'","F'","G'","H'","I'","J'","K'","L'","M'","N'","O'","P'","Q'","R'","S'","
T'","U'","V'","W'","X'","Y'","Z'"]

print("\n"+"Left Factoring".center(30,".")+"\n")
s= [input("Enter the production: ")]


print('Ouput:')

for r in s:
   while(True):
      rules=[]
      common=[]
      split=r.split("->")
      starting=split[0]
      for i in split[1].split("|"):
         rules.append(i)

   #logic for taking commons out
      for k, l in groupby(rules).items():
         r = [l[0] for l in takewhile(prefix, zip(*l))]
         common.append(''.join(r))
   #end of taking commons
      for i in common:
         newalphabet=alphabetset.pop()
         print(starting+"->"+i+newalphabet)
         index=[]
         for k in rules:
            if(k.startswith(i)):
               index.append(k)
         print(newalphabet+"->",end="")
         for j in index[:-1]:
            stringtoprint=j.replace(i,"", 1)+"|"
            if stringtoprint=="|":
               print("\u03B5","|",end="")
            else:
               print(j.replace(i,"", 1)+"|",end="")
         stringtoprint=index[-1].replace(i,"", 1)+"|"
         if stringtoprint=="|":
            print("\u03B5","",end="")
```

```
        else:
            print(index[-1].replace(i,"", 1)+"",end="")
        print("")
    break
```

IMPLEMENTATION

RESULT

Code was successfully implemented and the output was verified.