# A Huffman Tree Node

import heapq

class node:

def \_\_init\_\_(self, freq, symbol, left=None, right=None):

# frequency of symbol

self.freq = freq

# symbol name (character)

self.symbol = symbol

# node left of current node

self.left = left

# node right of current node

self.right = right

# tree direction (0/1)

self.huff = ''

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

return self.freq < nxt.freq

# utility function to print huffman

# codes for all symbols in the newly

# created Huffman tree

def printNodes(node, val=''):

# huffman code for current node

newVal = val + str(node.huff)

# if node is not an edge node

# then traverse inside it

if(node.left):

printNodes(node.left, newVal)

if(node.right):

printNodes(node.right, newVal)

# if node is edge node then

# display its huffman code

if(not node.left and not node.right):

print(f"{node.symbol} -> {newVal}")

# characters for huffman tree

chars = ['a', 'b', 'c', 'd', 'e', 'f']

# frequency of characters

freq = [ 5, 9, 12, 13, 16, 45]

# list containing unused nodes

nodes = []

# converting characters and frequencies

# into huffman tree nodes

for x in range(len(chars)):

heapq.heappush(nodes, node(freq[x], chars[x]))

while len(nodes) > 1:

# sort all the nodes in ascending order

# based on their frequency

left = heapq.heappop(nodes)

right = heapq.heappop(nodes)

# assign directional value to these nodes

left.huff = 0

right.huff = 1

# combine the 2 smallest nodes to create

# new node as their parent

newNode = node(left.freq+right.freq, left.symbol+right.symbol, left, right)

heapq.heappush(nodes, newNode)

# Huffman Tree is ready!

printNodes(nodes[0])