```cpp
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//Name                          Sai Chaitanya Kilambi
//Course                        CPSC 131 Data Structures, Fall, 2022
//Assignment                    No.4 question:1
//Due date                      09/21/2022
// Purpose:
// This program displays the vowels, uppercase letters and lowercase letters in the input sentence
//
// list of libraries
//
//importing the required libraries

#include <iostream>
#include<iomanip>
#include <string>

template <class T, int n>
class Stack
{
private:
    T Element[n];
    int counter = 0;

public:
    void clearStack()
    {
        counter = 0;
    }
    bool emptyStack()
    {
        return (counter == 0 ? true :
            false);
    }
    bool fullStack()
    {
        return (counter == n ? true :
            false);
    }
    void pushStack(T x)
    {
        Element[counter] = x;
        counter++;
    }
    T popStack()
    {
```

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46          counter--;
47          return Element[counter];
48      }
49
50  };
51
52  int main()
53  {
54  //generating random numbers
55  srand(time(NULL));
56
57  //declaring input prompt
58  std::string sentence;
59  std::cout << "Enter a sentence: ";
60  std::getline(std::cin, sentence);
61
62  //creating stacks
63  Stack<char,80> sUpper;
64  Stack<char,80> sLower;
65  Stack<char,80> sVowels;
66  char ch;
67
68  //using for loop to go over the sentance charecter by charecter and sort
      based on the case
69  for (int i = 0; i < sentence.size(); ++i) {
70      ch = sentence[i];
71      //lower case
72      if (islower(ch)) {
73          sLower.pushStack(ch);
74          if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u')
               { //pushing if vowel
75              sVowels.pushStack(ch);
76          }
77      }
78      else {
79          //upper case
80          if (isupper(ch)) {
81              sUpper.pushStack(ch);
82              if (ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' || ch ==
                  'U') { //pushing if vowel
83                  sVowels.pushStack(ch);
84              }
85          }
86      }
87  }
88  //output prompts
89  std::cout << " Uppercase letters:";
90
91  //printing the upper case letters
```

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while(!sUpper.emptyStack()){
    std::cout << " " <<sUpper.popStack();
}
std::cout << std::endl;


//output prompts
std::cout << " Lowercase letters:";

//printing the lower case letters
while(!sLower.emptyStack()) {
    std::cout << " " << sLower.popStack();
}
std::cout << std::endl;

//output prompts
std::cout << " Vowels:";

//printing the Vowels
while(!sVowels.emptyStack()) {
    std::cout << " " << sVowels.popStack();
}
std::cout << std::endl;
return 0;
}
```