

Paper – 2

(PRACTICAL)

(Reading Time: 15 minutes)

(Planning Session AND Examination Session: Three Hours)

The total time to be spent on the Planning Session and the Examination Session is Three hours. After completing the Planning Session, the candidates may begin with the Examination Session. A maximum of 90 minutes is permitted for the Planning Session. However, if candidates finish earlier, they are to be permitted to begin the Examination Session.

(Maximum Marks: 80)

INSTRUCTIONS

As it is a practical examination the candidate is expected to do the following:

- (a) Write an algorithm for the selected problem.
 - (b) Write a program in C++ or Java. Document the program by using mnemonic names and comments.
 - (c) Test run the program on the computer using the given test data and get a print out (hardcopy) in the format specified in the problem along with the program listing.
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Solve any one of the following Problems

Question 1

A Smith number is a composite number, the sum of whose digits is the sum of the digits of its prime factors obtained as a result of prime factorisation (excluding 1). The first few such numbers are 4, 22, 27, 58, 85, 94, 121...

Example:

1. 666
Prime factors are 2, 3, 3, and 37
Sum of the digits are $(6+6+6) = 18$
Sum of the digits of the factors $(2+3+3+(3+7)) = 18$

This Paper consists of 4 printed pages.

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Turn over

Write
number or not.

Sample data:

Input 94	Output	SMITH Number
Input 102	Output	NOT SMITH Number
Input 666	Output	SMITH Number
Input 999	Output	NOT SMITH Number

Question 2

A sentence is terminated by either “.”, “!” or “?” followed by a space. Input a piece of text consisting of sentences. Assume that there will be a maximum of 10 sentences in block letters.

Write a program to:

- obtain the length of the sentence (measured in words) and the frequency of vowels in each sentence
- generate the output as shown below using the given data

Sample data:

INPUT

HELLO! HOW ARE YOU? HOPE EVERYTHING IS FINE. BEST OF LUCK.

OUTPUT

Sentence	No. of Vowels	No. of Words
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1	2	1
2	5	3
3	8	4
4	3	3

1 VVVVVV
WWW

2 VVVVVVVVVVVVVVVVV
WWWWWWWWW

3 VVVVVVVVVVVVVVVVVVVVVVVVVVVVV
WWWWWWWWWWW

4 VVVVVVVVV
WWWWWWWWW

Scale used: 1: 3

Question 3

Given a square matrix list [][] of order 'n'. The maximum value possible for 'n' is 20. Input the value for 'n' and the positive integers in the matrix and perform the following tasks:

1. Display the original matrix
2. Print the row and column position of the largest element of the matrix
3. Print the row and column position of the second largest element of the matrix
4. Sort the elements of the rows in the ascending order and display the new matrix

Sample Data:

INPUT:

N=3

List [][]

5 1 3

7 4 6

9 8 2

9 8 2

The largest element 9 is in row 3 and column 1

The second largest element 8 is in row 3 and column 2

Sorted list

1 3 5

4 6 7

2 8 9