

COMPUTER SCIENCE – 2008

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 Sessions 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++/Java. Document your 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 (hard copy) in the format specified in the problem along with the program listing.

*Solve any **one** of the following problems:*

- Q1.** 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 factorization (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 $(2+3+3+(3+7)) = 18$

2. 4937775

Prime factors are 3, 5, 5, 65837

Sum of the digits are $(4+9+3+7+7+7+5) = 42$

Sum of the digits of the factors $(3+5+5+(6+5+8+3+7)) = 42$

Write a program to input a number and display whether the number is a Smith 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

Q2. 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 a block.

Write a program to:

- (i) Obtain the length of the sentence (measured in words) and the frequency of vowels in each sentence.
- (ii) 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
1	2	1
2	5	3
3	8	4
4	3	3

Sentence	No. of words/vowels
1	VVVVVV WWW
2	VVVVVVVVVVVVVVVVVV WWWWWWWWWW
3	VVVVVVVVVVVVVVVVVVVVVVVVVVVVV WWWWWWWWWWWWWWWW

Scale used 1:3

Q3. 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 task:

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

OUTPUT

5	1	3
7	4	6
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
