COMPUTER SCIENCE

Paper – 2

(PRACTICAL)

(Reading Time: 15 minutes)

(Planning Session AND Examination Session: Three Hours)

The total time to be spent on the Planning and the Examination Session is Three hours.

After completing the Planning Session, the candidate may begin with the Examination Session.

A maximum of 90 minutes is permitted to begin the Examination Session.

However, if candidates finish earlier, they are to be permitted to begin the Examination Session.

(Maximum Marks: 80)

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

1. Write an algorithm for the selected problem. **[10]**
   (Algorithm should be expressed clearly using any standard scheme such as pseudo code or in steps which are simple enough to be obviously computable.)
2. Write a program in **JAVA** language. The program should follow the algorithm and should be logically and syntactically correct. **[20]**
3. Document the program using mnemonic names / comments, identifying and clearly describing the choice of data types and meaning of variables. **[10]**
4. Code / Type the program on the computer and get a printout (hard copy). Typically, this should be a program that compiles and runs correctly. **[10]**
5. Test run the program on the computer using the given sample data and get a printout of the output in the format specified in the problem. **[10]**
6. Viva-Voce on the **Selected Problem.** **[20]**

This Paper consists of 4 printed pages.

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

Question 1

Given two positive numbers M and N, such that M is between 100 and 10000 and N is less than 100. Find the smallest integer that is greater than M and whose digits add up to N. For example, if M = 100 and N = 11, then the smallest integer greater than 100 whose digits add up to 11 is 119.

Write a program to accept the numbers M and N from the user and print the smallest required number whose sum of all its digits is equal to N. Also, print the total number of digits present in the required number. The program should check for the validity of the inputs and display an appropriate message for an invalid input.

Test your program with the sample data and some random data:

Example 1

INPUT: M = 100

N = 11

OUTPUT: The required number = 119
Total number of digits = 3

Example 2

INPUT: M = 1500

N = 25

OUTPUT: The required number = 1699
Total number of digits = 4

Example 3

INPUT: M = 99

N = 11

OUTPUT: INVALID INPUT

Example 4

INPUT: M = 112

N = 130

OUTPUT: INVALID INPUT

Question 2

Write a program to declare a square matrix A[ ][ ] of order MxM where 'M' is the number of rows and the number of columns, such that M must be greater than 2 and less than I 0. Accept the value of M as user input. Display an appropriate message for an invalid input. Allow the user to input integers into this matrix. Perform the following tasks:

(a) Display the original matrix.

(b) Rotate the matrix 90° clockwise as shown below:

```
Original matrix        Rotated matrix
   1  2  3               7  4  1
   4  5  6               8  5  2
   7  8  9               9  6  3
```

(c) Find the sum of the elements of the four comers of the matrix.

Test your program with the sample data and some random data:

Example 1

INPUT :

```
M = 3
3     4     9
2     5     8
1     6     7
```

OUTPUT :

```
ORIGINAL MATRIX

              3     4     9
              2     5     8
              1     6     7
MATRIX AFTER ROTATION

              1     2     3
              6     5     4
              7     8     9
Sum of the corner elements = 20
```

Example 2

INPUT :

```
M = 4
1     2     4     9
2     5     8     3
1     6     7     4
3     7     6     5
```

OUTPUT :

```
ORIGINAL MATRIX

              1     2     4     9
              2     5     8     3
              1     6     7     4
              3     7     6     5
```

MATRIX AFTER ROTATION

```
        3   1   2   1
        7   6   5   2
        6   7   8   4
        5   4   3   9
```

Sum of the corner elements = 18

Example 3

INPUT : M = 14

OUTPUT : SIZE OUT OF RANGE

Question 3

Write a program to accept a sentence which may be terminated by either '.' or '?' only. The words are to be separated by a single blank space. Print an error message if the input does not terminate with '.' or '?'. You can assume that no word in the sentence exceeds 15 characters, so that you get a proper formatted output.

Perform the following tasks:

(i) Convert the first letter of each word to uppercase.

(ii) Find the number of vowels and consonants in each word and display them with proper headings along with the words.

Test your program with the following inputs.

Example 1

INPUT : Intelligence plus character is education.

OUTPUT :

```
Intelligence Plus Character Is Education

Word          Vowels     Consonants
Intelligence    5           7
Plus            1           3
Character       3           6
Is              1           1
Education       5           4
```

Example 2

INPUT : God is great.

OUTPUT :

```
God Is Great

Word          Vowels     Consonants
God             1           2
Is              1           1
Great           2           3
```

Example 3

INPUT: All the best!

OUTPUT: Invalid Input.