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. **[20]**
6. Viva-Voce on the **Selected Problem.** **[20]**

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

Question 1

A Composite Magic number is a positive integer which is composite as well as a magic number.

Composite number: A composite number is a number that has more than two factors.

For example: 10
Factors are: 1, 2, 5, 10

Magic number: A magic number is a number in which the eventual sum of the digits is equal to 1

For example: 28=2+8=10=1+0=1

Accept two positive integers m and n, where m is less than n as user input. Display the number of Composite magic integers that are in the range between m and n (both inclusive) and output them along with the frequency, in the format specified below.

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

Example 1:

INPUT: m = 10

n = 100

OUTPUT:

THE COMPOSITE MAGIC INTEGERS ARE:

10, 28, 46, 55, 64, 82, 91, 100

FREQUENCY OF COMPOSITE MAGIC INTEGERS IS: 8

Example 2:

INPUT: m = 1200

n = 1300

OUTPUT:

THE COMPOSITE MAGIC INTEGERS ARE:

1207, 1216, 1225, 1234, 1243, 1252, 1261, 1270, 1288

FREQUENCY OF COMPOSITE MAGIC INTEGERS IS: 9

Example 3:

INPUT: m = 120

n = 99

OUTPUT:

INVALID INPUT

Question 2

Write a program to declare a square matrix A[ ] [ ] of order (M x M) where 'M' is the number of rows and the number of columns such that M must be greater than 2 and less than 10. 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) Check if the given matrix is Symmetric or not.
A square matrix is said to be Symmetric, if the element of the i^{th} row and j^{th} column is equal to the element of the j^{th} row and i^{th} column.

(c) Find the sum of the elements of left diagonal and the sum of the elements of right diagonal of the matrix and display them.

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

Example 1

INPUT : M = 3

1 2 3
2 4 5
3 5 6

OUTPUT :

ORIGINAL MATRIX

1 2 3
2 4 5
3 5 6

THE GIVEN MATRIX IS SYMMETRIC
The sum of the left diagonal = 11
The sum of the right diagonal = 10

Example 2

INPUT : M = 4

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

OUTPUT :

ORIGINAL MATRIX

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

THE GIVEN MATRIX IS NOT SYMMETRIC
The sum of the left diagonal = 17
The sum of the right diagonal = 20

Example 3

INPUT **:** M = 22

OUTPUT **:** THE MATRIX SIZE IS OUT OF RANGE

Question 3

Write a program to accept a sentence which may be terminated by either '.' '?' or '!' only. Any other character may be ignored. The words may be separated by more than one blank space and are in UPPER CASE.

Perform the following tasks:

(a) Accept the sentence and reduce all the extra blank space between two words to a single blank space.

(b) Accept a word from the user which is part of the sentence along with its position number and delete the word and display the sentence.

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

Example 1

INPUT: A MORNING WALK IS A IS BLESSING FOR THE WHOLE DAY.

WORD TO BE DELETED: IS
WORD POSITION IN THE SENTENCE: 6

OUTPUT: A MORNING WALK IS A BLESSING FOR THE WHOLE DAY.

Example 2

INPUT: AS YOU SOW, SO SO YOU REAP.

WORD TO BE DELETED: SO
WORD POSITION IN THE SENTENCE: 4

OUTPUT: AS YOU SOW, SO YOU REAP.

Example 3

INPUT: STUDY WELL ##.

OUTPUT: INVALID INPUT.