COMPUTER SCIENCE

Paper – 2

(PRACTICAL)

(Maximum Marks: 30)

(Time allowed: Three hours)

(*Candidates are allowed additional 15 minutes for only reading the paper.*

*They must NOT start writing during this time.***)**

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

Planning session: 90 minutes

Examination session: 90 minutes

Note: Candidates are to be permitted to proceed to the Examination Session only after 90 minutes of the Planning Session are over.

---

*This paper consists of **three** problems from which candidates are required to attempt **any one** problem.*

Candidates are expected to do the following:

1. Write an algorithm for the selected problem. **[3]**
(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. Document the program using mnemonic names / comments, identifying and clearly describing the choice of data types and meaning of variables. **[7]**

3. Code / Type the program on the computer and get a printout (hard copy). Typically, this should be a program that compiles and runs correctly. **[2]**

4. 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. **[3]**

In addition to the above, the practical file of the candidate containing the practical work related to programming assignments done during the year is to be evaluated as follows:

- Programming assignments done throughout the year (by the teacher) **[10]**
- Programming assignments done throughout the year (by the Visiting Examiner) **[5]**

This Paper consists of 5 printed pages and 1 blank page.

Solve any one of the following problems

Question 1

A Prime-Adam integer is a positive integer (without leading zeros) which is a prime as well as an Adam number.

Prime number: A number which has only two factors, i.e. 1 and the number itself.

Example: 2, 3, 5, 7 … etc.

Adam number: The square of a number and the square of its reverse are reverse to each other.

Example: If n=13 and reverse of 'n'= 31, then,

$(13)^2 = 169$

$(31)^2 = 961$ which is reverse of 169

thus 13, is an Adam number.

Accept two positive integers m and n, where m is less than n as user input. Display all Prime-Adam integers that are in the range between m and n (both inclusive) and output them along with the frequency, in the format given below:

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

Example 1

INPUT: m = 5
n = 100

OUTPUT: THE PRIME-ADAM INTEGERS ARE:
11 13 31
FREQUENCY OF PRIME-ADAM INTEGERS IS: 3

Example 2

INPUT: m = 100
n = 200

OUTPUT: THE PRIME-ADAM INTEGERS ARE:
101 103 113
FREQUENCY OF PRIME-ADAM INTEGERS IS: 3

Example 3

INPUT: m = 50
n = 70

OUTPUT: THE PRIME-ADAM INTEGERS ARE:
NIL
FREQUENCY OF PRIME-ADAM INTEGERS IS: 0

Example 4

INPUT: m = 700
n = 450

OUTPUT: INVALID INPUT.

Question 2

Write a program to declare a matrix A[ ] [ ] of order (M x N) where 'M' is the number of rows and 'N' is the number of columns such that the value of 'M' must be greater than 0 and less than 10 and the value of 'N' must be greater than 2 and less than 6. Allow the user to input digits (0 - 7) only at each location, such that each row represents an octal number.

Example: 2 3 1 (decimal equivalent of 1st row = 153 i.e. $2x8^2 + 3x8^1 + 1x8^0$)

4 0 5 (decimal equivalent of 2nd row = 261 i.e. $4x8^2 + 0x8^1 + 5x8^0$)

1 5 6 (decimal equivalent of 3rd row = 110 i.e. $1x8^2 + 5x8^1 + 6x8^0$)

Perform the following tasks on the matrix:

(a) Display the original matrix.

(b) Calculate the decimal equivalent for each row and display as per the format given below.

Test your program for the following data and some random data:

Example 1

INPUT:
M = 1
N = 3
ENTER ELEMENTS FOR ROW 1: 1 4 4

OUTPUT:

FILLED MATRIX	DECIMAL EQUIVALENT
1 4 4	100

Example 2

INPUT:
M = 3
N = 4
ENTER ELEMENTS FOR ROW 1: 1 1 3 7
ENTER ELEMENTS FOR ROW 2: 2 1 0 6
ENTER ELEMENTS FOR ROW 3: 0 2 4 5

OUTPUT:

FILLED MATRIX	DECIMAL EQUIVALENT
1 1 3 7	607
2 1 0 6	1094
0 2 4 5	165

Example 3

INPUT: M = 3
N = 3
ENTER ELEMENTS FOR ROW 1: 2 4 8

OUTPUT: INVALID INPUT

Example 4

INPUT: M = 4
N = 6

OUTPUT: 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 and are in UPPER CASE.

Perform the following tasks:

(a) Check for the validity of the accepted sentence only for the terminating character.

(b) Arrange the words in ascending order of their length. If two or more words have the same length, then sort them alphabetically.

(c) Display the original sentence along with the converted sentence.

Test your program for the following data and some random data:

Example 1

INPUT: AS YOU SOW SO SHALLYOU REAP.

OUTPUT: AS YOU SOW SO SHALLYOU REAP.
AS SO SOW YOU YOU REAP SHALL

Example 2

INPUT: SELF HELP IS THE BEST HELP.

OUTPUT: SELF HELP IS THE BEST HELP.
IS THE BEST HELP HELP SELF

Example 3

INPUT: BE KIND TO OTHERS.

OUTPUT: BE KIND TO OTHERS.
BE TO KIND OTHERS

Example 4

INPUT: NOTHING IS IMPOSSIBLE#

OUTPUT: INVALID INPUT