# 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**

An ISBN (International Standard Book Number) is a ten digit code which uniquely identifies a book.

The first nine digits represent the Group, Publisher and Title of the book and the last digit is used to check whether ISBN is correct or not.

Each of the first nine digits of the code can take a value between 0 and 9. Sometimes it is necessary to make the last digit equal to ten; this is done by writing the last digit of the code as X.

To verify an ISBN, calculate 10 times the first digit, plus 9 times the second digit, plus 8 times the third and so on until we add 1 time the last digit. If the final number leaves no remainder when divided by 11, the code is a valid ISBN.

For Example:

1.      $0201103311 = 10*0 + 9*2 + 8*0 + 7*1 + 6*1 + 5*0 + 4*3 + 3*3 + 2*1 + 1*1 = 55$

        Since 55 leaves no remainder when divided by 11, hence it is a valid ISBN.

2.      $007462542X = 10*0 + 9*0 + 8*7 + 7*4 + 6*6 + 5*2 + 4*5 + 3*4 + 2*2 + 1*10 = 176$

        Since 176 leaves no remainder when divided by 11, hence it is a valid ISBN.

3.      $0112112425 = 10*0 + 9*1 + 8*1 + 7*2 + 6*1 + 5*1 + 4*1 + 3*4 + 2*2 + 1*5 = 71$

        Since 71 leaves no remainder when divided by 11, hence it is not a valid ISBN.

Design a program to accept a ten digit code from the user. For an invalid input, display an appropriate message. Verify the code for its validity in the format specified below:

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

**Example 1**

INPUT CODE      :       0201530821

OUTPUT          :       SUM = 99

                        LEAVES NO REMAINDER – VALID ISBN CODE

**Example 2**

INPUT CODE      :       035680324

OUTPUT          :       INVALID INPUT

**Example 3**

INPUT CODE      :       0231428031

OUTPUT          :       SUM = 122

                        LEAVES REMAINDER – INVALID ISBN CODE

**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 20. Allow the user to input integers into this matrix. Display appropriate error message for an invalid input. Perform the following tasks:

(a) Display the input matrix.

(b) Create a mirror image matrix.

(c) Display the mirror image matrix.

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

**Example 1**

INPUT          :         M = 3

                              4      16     12
                              8       2     14
                              4       1      3

OUTPUT       :

          ORIGINAL MATRIX

                              4      16     12
                              8       2     14
                              4       1      3

          MIRROR IMAGE MATRIX

                             12     16      4
                             14      2      8
                              3      1      6

**Example 2**

INPUT          :         M = 22

OUTPUT       :         SIZE OUT OF RANGE

**Question 3**

A **Palindrome** is a word that may be read the same way in either direction.

Accept a sentence in **UPPER CASE** which is terminated by either " . ", " ? " or " ! ".

Each word of the sentence is separated by a single blank space.

Perform the following tasks:

(a)      Display the count of palindromic words in the sentence.

(b)      Display the palindromic words in the sentence.

Example of palindromic words:

        MADAM, ARORA, NOON

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

**Example 1**

INPUT         :         MOM AND DAD ARE COMING AT NOON.

OUTPUT     :         MOM DAD NOON

                        NUMBER OF PALINDROMIC WORDS : 3

**Example 2**

INPUT         :         NITIN ARORA USES LIRIL SOAP.

OUTPUT     :         NITIN ARORA LIRIL

                        NUMBER OF PALINDROMIC WORDS : 3

**Example 3**

INPUT         :         HOW ARE YOU?

OUTPUT     :         NO PALINDROMIC WORDS