

I PRE BOARD EXAMINATION COMPUTER SCIENCE

Paper – 2 (PRACTICAL)

*(Candidates are allowed an 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. (Algorithm should be expressed
clearly using any standard scheme such as pseudo code or in steps which are
simple enough to be obviously computable.)* [3]
- 2. Write a program in Java language. The program should follow the algorithm
and should be logically and syntactically correct.* [5]
- 3. Document the program using mnemonic names/ comments, identifying and
clearly describing the choice of data types and meaning of variables.* [2]
- 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.* [2]
- 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.* [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]
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This paper consists of 4 printed pages.

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 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 uppercase. Perform the following tasks:

- Check for the validity of the accepted sentence.
- Convert the non-palindrome words of the sentence into palindrome words by concatenating the word by its reverse (excluding the last character).

Example :

The reverse of the word 'HELP' would be LEH (omitting the last alphabet), and by concatenating both, the new palindrome word is HELPLEH. Thus, the word HELP becomes HELPLEH. Note: The words which end with repeated alphabets, for example ABB would become ABBA and not ABBBA and XAZZZ becomes XAZZZAX.

[Palindrome word: Spells same from either side. Example: DAD, MADAM etc.]

- Display the original sentence along with the converted sentence. Test your program for the following data and some random data:

Example 1

INPUT : THE BIRD IS FLYING.
OUTPUT : THE BIRD IS FLYING.
THEHT BIRDIB ISI FLYINGNIYLF

Example 2

INPUT : IS THE WATER LEVEL RISING?
OUTPUT : IS THE WATER LEVEL RISING?
ISI THEHT WATERETAW LEVEL RISINGNISIR

Example 3

INPUT : THIS MOBILE APP LOOKS FINE.
OUTPUT : THIS MOBILE APP LOOKS FINE.
THISIHT MOBILELIBOM APPA LOOKSKOOL FINENIF

Example 3

INPUT : YOU MUST BE CRAZY#
OUTPUT : INVALID INPUT

Question 3

Write a program to declare a single-dimensional array $a[]$ and a square matrix $b[][]$ of size N , where $N > 2$ and $N < 10$. Allow the user to input positive integers into the single dimensional array.

Perform the following tasks on the matrix:

1. Sort the elements of the single-dimensional array in ascending order using any standard sorting technique and display the sorted elements.
2. Fill the square matrix $b[][]$ in the following format: If the array $a[] = \{5, 2, 8, 1\}$ then, after sorting $a[] = \{1, 2, 5, 8\}$ Then, the matrix $b[][]$ would fill as below:

```
1 2 5 8
```

```
1 2 5 1
```

```
1 2 1 2
```

```
1 1 2 5
```

3. Display the filled matrix in the above format.

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

Example 1

INPUT : $N = 3$

ENTER ELEMENTS OF SINGLE DIMENSIONAL ARRAY : 3 1 7

OUTPUT : SORTED ARRAY : 1 3 7

FILLED MATRIX 1 3 7

```
1 3 1
```

```
1 1 3
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Example 2

INPUT : $N = 13$

OUTPUT : MATRIX SIZE OUT OF RANGE

Example 3

INPUT : $N = 5$

ENTER ELEMENTS OF SINGLE DIMENSIONAL ARRAY: 10 2 5 23 6

OUTPUT : SORTED ARRAY : 2 5 6 10 23

FILLED MATRIX 2 5 6 10 23

```
2 5 6 10 2
```

```
2 5 6 2 5
```

```
2 5 2 5 6
```

```
2 2 5 6 10
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