
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 bank intends to design a program to display the denomination of an input amount, up to 5 digits. The available denomination with the bank are of rupees 1000 , 500 , 100 , 50 , 20 , 10 , 5 , 2 , and 1.

Design a program to accept the amount from the user and display the break-up in descending order of denomination. (i.e. preference should be given to the highest denomination available) along with the total number of notes. [Note: Only the denomination used should be displayed]. Also print the amount in words according to the digits.

Example 1

INPUT : 14856
OUTPUT : ONE FOUR EIGHT FIVE SIX

DENOMINATION	:	1000	x	14	=	14000
		500	x	1	=	500
		100	x	3	=	300
		50	x	1	=	50
		5	x	1	=	5
		1	x	1	=	1
TOTAL					=	14856
TOTAL NUMBER OF NOTES					=	21

Example 2

INPUT : 6043
OUTPUT : SIX ZERO FOUR THREE

DENOMINATION	:	1000	x	6	=	6000
		20	x	2	=	40
		2	x	1	=	2
		1	x	1	=	1
TOTAL					=	6043
TOTAL NUMBER OF NOTES					=	10

Example 3

INPUT : 235001
OUTPUT : INVALID AMOUNT

Question 2

A positive whole number 'n' that has 'd' number of digits is squared and split into two pieces, a right-hand piece that has 'd' digits and a left-hand piece that has remaining 'd' or 'd-1' digits. If the sum of the two pieces is equal to the number, then 'n' is a Kaprekar number. The first few Kaprekar numbers are: 9, 45, 297

Example 1:

9
 $9^2 = 81$, right-hand piece of 81 = 1 and left hand piece of 81 = 8
 Sum = 1 + 8 = 9, i.e. equal to the number.

Example 2:

45
 $45^2 = 2025$, right-hand piece of 2025 = 25 and left hand piece of 2025 = 20
 Sum = 25 + 20 = 45, i.e. equal to the number.

Example 3:

297
 $297^2 = 88209$, right-hand piece of 88209 = 209 and left hand piece of 88209 = 88
 Sum = 209 + 88 = 297, i.e. equal to the number.

Given the two positive integers p and q , where $p < q$, write a program to determine how many Kaprekar numbers are there in the range between p and q (both inclusive) and output them.

The input contains two positive integers p and q . Assume $p < 5000$ and $q < 5000$. You are to output the number of Kaprekar numbers in the specified range along with their values in the format specified below:

SAMPLE DATA:

INPUT:

$$p = 1$$

$$q = 1000$$

OUTPUT:

THE KAPREKAR NUMBERS ARE:-

1, 9, 45, 55, 99, 297, 703, 999

FREQUENCY OF KAPREKAR NUMBERS IS: 8

Question 3

Input a paragraph containing 'n' number of sentences where $(1 \leq n < 4)$. The words are to be separated with a single blank space and are in UPPERCASE. A sentence may be terminated either with a full stop '.' or a question mark '?' only. Any other character may be ignored. Perform the following operations:

- Accept the number of sentences. If the number of sentences exceeds the limit, an appropriate error message must be displayed.
- Find the number of words in the whole paragraph
- Display the words in ascending order of their frequency. Words with same frequency may appear in any order.

Example 1

INPUT: Enter number of sentences.
1
Enter sentences.
TO BE OR NOT TO BE.

OUTPUT: Total number of words: 6

WORD	FREQUENCY
OR	1
NOT	1
TO	2
BE	2

Example 2

INPUT: Enter number of sentences
3
Enter sentences.
THIS IS A STRING PROGRAM.IS THIS EASY?YES,IT IS.

OUTPUT: Total number of words: 11

WORD	FREQUENCY
A	1
STRING	1
PROGRAM	1
EASY	1
YES	1
IT	1
THIS	2
IS	3

Example 3

INPUT: Enter number of sentences
5
OUTPUT: Invalid entry