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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]

This Paper consists of 4 printed pages.

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 $(1 = < n < 4)$. 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:

- i. Accept the number of sentences. If the number of sentences exceeds the limit, an appropriate error message must be displayed.
- ii. Find the number of words in the whole paragraph
- iii. 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