

ST. THOMAS SCHOOL
HOLIDAY HOMEWORK
CLASS: XI

Computer Science

Project Work

Note : Solve and execute the following programs and write the compiled and tested program in a transparent file as a project.

Question 1:

An Achilles Number is a number that is powerful but not a perfect power.

A Powerful Number is a positive integer N , such that for every prime factor p of N , p^2 is also a factor.

A Perfect Power is a positive integer N such that it can be expressed as a^b , where a and b are natural numbers > 1 .

72, 108, 200, 288 are some of the first few Achilles Numbers.

The prime factors of $72 = 2 \times 2 \times 2 \times 3 \times 3$.

Both 2 and $2^2 = 4$ are factors of 72.

Both 3 and $3^2 = 9$ are factors of 72.

Also, 72 can't be represented as a^b .

Therefore, 72 is an Achilles Number.

Write a program in Java to input an integer from the user and check whether it is an Achilles Number or not.

Question 2:

A sphenoid number is a positive integer which has exactly three distinct prime factors.

For example, 30 is a sphenoid number because $30 = 2 \times 3 \times 5$.

66, 70, 78, 102, 114 are some more examples of sphenoid numbers.

Write a program in Java to input a positive integer from the user and check whether it is a sphenoid number or not.

Question 3:

Write a program to input an integer from the user, and check if that number is a full prime.

A number is said to be a full prime if it is a prime number and all its digits are also prime numbers.

For example, 23 is a full prime number because 23 is prime, and all its digits 2, 3 are also prime.

Question 4:

A Multiple Harshad number is an integer which when divided by the sum of its digits, produces another Harshad number.

For example, consider the number 6804.

$$6 + 8 + 0 + 4 = 18.$$

$$6804 / 18 = 378$$

$$3 + 7 + 8 = 18$$

$$1 + 8 = 9.$$

$$18 / 9 = 2.$$

So, 6804 is a Multiple Harshad number.

A Harshad number is an integer which is divisible by the sum of its digits. It is also known as a Niven number.

For example, 18 is a Harshad number, because $1 + 8 = 9$, which divides 18.

Write a program in Java to enter a number and check if it is a Multiple Harshad number.

Question 5:

IMEI (International Mobile Equipment Identity) is a number which is used to identify mobile phones. It consists of 15 digits that include various information about the mobile device.

The steps to check if an IMEI number is valid are as follows:

1. Starting from the rightmost digit, find the double of every second digit.
2. If the new value is a 2-digit number, then add the digits of that number to form a new 1-digit number.
3. Find the sum of all the digits.
4. If the sum is divisible by 10, then it is a valid IMEI number, otherwise not.

Write a Java program to accept a number and check if it is a valid IMEI number. Display a suitable message accordingly.

Question 6:

A Fascinating number is one which when multiplied by 2 and 3 and then, after the results are concatenated with the original number, the new number contains all the digits from 1 to 9 exactly once. There can be any number of zeroes and are to be ignored.

Example: 273
 $273 \times 1 = 273$
 $273 \times 2 = 546$
 $273 \times 3 = 819$

Concatenating the results we get, 273546819 which contains all digits from 1 to 9 exactly once.

Thus, 273 is a Fascinating number.

Accept two positive integers m and n, where m must be less than n and the values of both 'm' and 'n' must be greater than 99 and less than 10000 as user input. Display all Fascinating numbers 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 = 100

n = 500

OUTPUT:

THE FASCINATING NUMBERS ARE:

192 219 273 327

FREQUENCY OF FASCINATING NUMBERS IS: 4

Question 7:

A MOBIUS function $M(N)$ returns the value -1 or 0 or 1 for a natural number (N) by the following conditions are defined:

When,

$$M(N) = 1 \text{ if } N = 1$$

$M(N) = 0$ if any prime factor of N is contained in N more than once.

$M(N) = (-1)^P$ if N is the product of 'P' distinct prime factors.

Write a program to accept a positive natural number (N) and display the MOBIUS result with proper message.

Design your program which will enable the output in the format given below:

Sample 1:

INPUT: 78

OUTPUT:

$$78 = 2 \times 3 \times 13$$

NUMBER OF DISTINCT PRIME FACTORS = 3

$$M(78) = -1$$

Sample 2:

INPUT: 34

OUTPUT:

$$34 = 2 \times 17$$

NUMBER OF DISTINCT PRIME FACTORS = 2

$$M(34) = 1$$

Sample 3:

INPUT: 12

OUTPUT:

$$12 = 2 \times 2 \times 3$$

DUPLICATE PRIME FACTORS

$$M(12) = 0$$

Sample 4:

INPUT: 1

OUTPUT:

$$1 = 1$$

NO PRIME FACTORS

$$M(1) = 1$$

Question 8:

A Goldbach number is a positive even integer that can be expressed as the sum of two odd primes.

Note: All even integer numbers greater than 4 are Goldbach numbers.

Example:

$$6 = 3 + 3$$

$$10 = 3 + 7$$

$$10 = 5 + 5$$

Hence, 6 has one odd prime pair 3 and 3. Similarly, 10 has two odd prime pairs, i.e. 3, 7 and 5, 5.

Write a program to accept an even integer 'N' where $N > 9$ and $N < 50$. Find all the odd prime pairs whose sum is equal to the number 'N'.

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

Example 1:

INPUT:

$$N = 14$$

OUTPUT:

Prime pairs are:

3, 11

7, 7

Example 2:

INPUT:

N = 30

OUTPUT:

Prime numbers are:

7, 23

11, 19

13, 17

Example 3:

INPUT:

N = 17

OUTPUT:

Invalid input. Number is odd.

Question 9:

A Prime-Adam integer is a positive integer (without leading zeroes) 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' is 31, then, $13^2 = 169$, and $31^2 = 961$ 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 10:

Write a program in Java to generate the Hailstone Sequence for a given number.

The Hailstone Sequence of numbers can be started from a given positive integer N.

The remaining terms of the sequence can be evaluated by applying the following rules:

If $N = 1$, then the sequence terminates.

If N is even, then the next term of the sequence is $N / 2$.

If N is odd, then the next term in the sequence is $3 \times N + 1$.

For example:

INPUT:

N = 13

OUTPUT:

40 20 10 5 16 8 4 2 1

Display an appropriate message if the number $N \leq 0$.

Question 11:

Write a program in Java to generate all the twin primes in the range 1 to N, where the value of N is entered by the user.

A twin prime is a pair of prime numbers with a difference of 2.

For example: 3, 5.

Sample Input:

N = 50

Sample Output:

3, 5

5, 7

11, 13

17, 19

29, 31

41, 43

Question 12:

A prime triplet is a collection of three prime numbers in the form

$(p, p + 2, p + 6)$ or $(p, p + 4, p + 6)$.

Write a program in Java to display all the possible prime triplets in the range m and n, where the value of m and n are entered by the user.

Example:

INPUT:

M=1

N=20

OUTPUT:

5,7,11

7,11,13

11,13,17
13,17,19

Question 13:

Write a program in Java to allow the user to enter a positive integer.
If the user enters a negative integer, then convert it into a positive integer.
Now check if the entered integer is a unique number or not.
A unique number is a positive integer without any duplicate digits.
Examples are 283, 7045, etc.

Question 14:

An autobiographical number is a number such that the first digit of it counts how many zeroes are there in it, the second digit counts how many ones are there and so on. An autobiographical number is like a self-descriptive number.
For example, 1210 has 1 zero, 2 ones, 1 two and 0 threes.
3211000 is another example of an autobiographical number.
Even the year 2020 is an autobiographical number!

Write a program in Java to input a positive number from the user and check whether that number is an autobiographical number or not.

Question 15:

A Jumping Number is a number in which each adjacent digit differs by only 1.
For example, 76789 is a Jumping Number.
Also note that all the one-digit numbers are considered to be Jumping Numbers.

Write a program in Java to input a positive integer and check whether it is a Jumping Number.

Display a suitable message accordingly.

BIOLOGY

1. Food and its components.
 2. pollution.
 3. Vermicomposting
 4. Blood group.
 5. Blood pressure.
 6. Mitosis
 7. Vitamins or sources.
 8. Transpiration of the plants.
- Make the project on any one of the topics listed above.

ENGLISH LANGUAGE

1. Write the review of a book that you have recently read.
2. Write a movie review that you have recently seen.
3. Write an essay on 'Faith' in about 500 words.

ENGLISH LITERATURE

1. Give the character sketch of Hanaguchi Gohei in about 400 words.
2. Comment on the opening scene of Macbeth.
3. Write the detailed summary of Abhisara, the Tryst.

ECONOMICS

Project I (roll no: 1-20)

Study consumer awareness among household designing a questionnaire and collection of primary data.

Project II (roll no.21-40)

Prepare a report on productivity awareness among enterprises through use of statistical data from statistical tables published in newspaper/ RBI Bulletin/ Budget/ Census Report/ Economic Survey etc.

Project III (roll no. 41-60)

Make a study of two cooperative institutions (example, milk cooperatives) with a view to compare the organisational and financial structure of the organisations, production capacity and output, marketing strategies, sales, market share etc.

HINDI

गद्य- पुत्र प्रेम कहानी का नाट्य रूपांतरण

भाषा- हिंदी के किन्हीं पांच कवियों एवं उनके द्वारा रचित एक कविता (जो पाठ्य पुस्तक में न हो) का परिचय (दोनों एक ही फाइल में बनेंगे)

COMMERCE PROJECT ,as discussed in class .

ACCOUNT PROJECT , prepare journal, ledger, trial balance.

CHEMISTRY

Topic : General Characteristics of S & P block elements

Mention the Following points:

- 1) Electronic Configuration
- 2) Atomic and ionic radii
- 3) Ionisation enthalpy
- 4) Electropositive or Electronegative character
- 5) Reducing and Oxidising nature
- 6) Nature of their oxides, hydroxides, carbonates, chlorides, sulphates and nitrates

MATHS

Project and Holiday Homework

- 1- Make 10 Linear inequations graphs with two variables.
- 2- Do first three exercise of A.P. and first exercise of trigonometric functions.

PHYSICS PROJECT

Project title:-

Flow of liquid

Note:-The project must be made according to following instructions:-

1. The project will contain the following pages;

- a. **Front Page** (Colored, typed): It must contain project title, school logo, School Name, Session (2023-24), submitted by (under this your name with class with section will be mentioned) and submitted to (under this name of your subject teacher i.e. Mr. Kaushlesh Tiwari will be mentioned)
- b. **Acknowledgement** (Black and White, typed)
- c. **Certificate** (Black and White, typed)
- d. **Index** (Black and White, typed)
- e. **10-Pages of content** in writing (hand written) including analysis/material aid (graph, data, structure, pie chart, histograms, diagrams etc.) along with conclusion of the investigatory project.
- f. **Bibliography**

2. This project must be **spiralled** with top transparent sheet and blue back sheet
