CPS Level -1 (Number Theory)

**Class - 24 :**

Class Link : <https://youtu.be/YG6RAZM7YRk>

**Discussed topics :**

1) Harmonic Series / Sum of Divisors / Sum of Number of Divisors

2) Sum of Divisors (Atcoder)

Link : <https://atcoder.jp/contests/abc172/tasks/abc172_d>

My Code : <https://paste.ubuntu.com/p/V4Dmhd8GdQ/>

**Class Tasks :**

All the problems discussed in class are class tasks.

**Class - 25 :**

Class Link : [Part 1](https://youtu.be/zyYPYdnX8ng) | [Part 2](https://youtu.be/wAe3uPi1Kqk)

**Discussed topics :**

1) Sieve of Eratosthenes

2) Goldbach's Conjecture (UVA)

Link : <https://vjudge.net/problem/UVA-543>

My Code : <https://paste.ubuntu.com/p/c6nGkcVxZD/>

**References:**

<http://www.shafaetsplanet.com/?p=624>

<http://www.lightoj.com/article_show.php?article=1001>

<https://cp-algorithms.com/algebra/sieve-of-eratosthenes.html>

**Class Tasks :**

All the problems discussed in class are class tasks.

**Class - 26 :**

Class Link :

<https://youtu.be/z0ooswSYaME>

Discussed topics :

1) Sieve of Eratosthenes(Bitwise Template)

2) TDPRIMES - Printing some primes (Spoj)

Link : <https://www.spoj.com/problems/TDPRIMES/>

My Code : <https://paste.ubuntu.com/p/Qj2vP73NF7/>

3) HS08PAUL - A conjecture of Paul Erdős (Spoj)

Link : <https://www.spoj.com/problems/HS08PAUL/>

My Code : <https://paste.ubuntu.com/p/zw2tTxzwJT/>

4) Sherlock and his girlfriend (Codeforces)

Link : <http://codeforces.com/contest/776/problem/B>

My Code : <http://codeforces.com/contest/776/submission/95598228>

5) Normal sieve template :

<https://pastebin.com/nVjdFvi6>

6) Using bitset :

<https://pastebin.com/WfbtGLM9>

7) Bitwise sieve :

<https://pastebin.com/07cb1QNs>

Bitset tutorial :

<https://www.geeksforgeeks.org/c-bitset-and-its-application/>

References:

<https://en.wikipedia.org/wiki/Prime-counting_function#Inequalities>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 27 :**

Class Link :

Part 1 : <https://youtu.be/8xfdoh_DL7s>

Part 2: <https://youtu.be/QMweK4OsetA>

Part 3: <https://youtu.be/ytNuzl1VnJI>

**Discussed topics :**

1) Prime Factorization

2) Prime Factors (UVA)

Link : <https://vjudge.net/problem/UVA-583>

My Code : <https://paste.ubuntu.com/p/4DPRy4BDMR/>

3) Largest Prime Divisor (UVA)

Link : <https://vjudge.net/problem/UVA-11466>

My Code : <https://paste.ubuntu.com/p/7vgRq6Fkvv/>

**References:**

<https://forthright48.com/prime-factorization-of-integer>

**Class Tasks :**

All the problems discussed in class are class tasks.

**Class - 28 :**

Class Link :

<https://youtu.be/t6DVDgnXCWc>

**Discussed topics :**

1) Prime Factorization

2) Almost Prime (Codeforces)

Link : <https://codeforces.com/contest/26/problem/A>

My Code : <https://codeforces.com/contest/26/submission/96227942>

3) MAIN12B - PrimeFactorofLCM (SPOJ)

Link : <https://www.spoj.com/problems/MAIN12B/>

My Code : <https://paste.ubuntu.com/p/Ppb3kC4Dsq/>

**Reference:**

<https://drive.google.com/file/d/1qWv5vczVHqDtBz2hU4TyWzVYjwJt6G7G/view?usp=sharing>

**Class Tasks :**

All the problems discussed in class are class tasks.

**Class - 29 :**

Class Link :

Part 1 : <https://youtu.be/8_PAS6VIwGk>

Part 2 : <https://youtu.be/4dbioFCfchs>

**Discussed topics :**

1) Number of divisors (NOD) ,Number of Divisors using harmonic mean

2) Number of Divisors (Spoj)

Link : <https://www.hackerearth.com/problem/algorithm/number-of-divisors-5/>

My Code : <https://paste.ubuntu.com/p/shbXHnhdK8/>

3) False Ordering (Light Oj)

Link : <http://lightoj.com/volume_showproblem.php?problem=1109>

Using harmonic mean and NOD: <https://paste.ubuntu.com/p/x5MYPhT6Tq/>

Using harmonic mean : <https://paste.ubuntu.com/p/jbdvS45Ztz/>

**Class Tasks :**

All the problems discussed in class are class tasks.

**Class - 30 :**

Class Link : <https://youtu.be/qSvLm3Idq4A>

Discussed topics :

1) NOD / GCD using Prime Factorization and Practice Problems

2) Number of Divisors (Hackerearth)

Link : <https://www.hackerearth.com/problem/algorithm/number-of-divisors-14/description/>

My Code : <https://paste.ubuntu.com/p/qGv5CqqYDb/>

3) COMDIV - Number of common divisors (Spoj)

Link : <https://www.spoj.com/problems/COMDIV/>

My Code : <https://paste.ubuntu.com/p/bKGC7H6q28/>

4) SINEGGS - Sinha and Eggs (Spoj)

Link : <https://www.spoj.com/problems/SINEGGS/>

My Code : <https://paste.ubuntu.com/p/2JSMBWSrDB/>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 31 :**

Class Link : <https://youtu.be/H2fyQ_9X8Kg>

**Discussed topics :**

1) NOD / SOD and Practice Problems

2) DIVSUM - Divisor Summation (Spoj)

Link : <https://www.spoj.com/problems/DIVSUM/>

My Code : <https://paste.ubuntu.com/p/t9YtdBs3cm/>

3) DIVSUM2 - Divisor Summation (Hard) (Spoj)

Link : <https://www.spoj.com/problems/DIVSUM2/>

My Code : <https://paste.ubuntu.com/p/M95QFsBbPw/>

**Class Tasks :**

All the problems discussed in class are class tasks.

**Class - 32 :**

Class Link :

Part 1 : <https://youtu.be/pqbek40slvA>

Part 2 : <https://youtu.be/EKOdqFMCaQ0>

Discussed topics :

1) Sum of Number of Divisors

My Code : <https://paste.ubuntu.com/p/CfXbvjZWj3/>

References :

<https://forthright48.com/divisor-summatory-function>

<https://forthright48.com/highly-composite-numbers>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 33 :**

Class Link : <https://youtu.be/T9f0WV5PefQ>

Discussed Topics:

1) Addition with Modular Arithmetic

2) Multiplication with Modular Arithmetic

3) Subtraction with Modular Arithmetic

4) Power with Modular Arithmetic

5) Big Mod(UVA)

Problem Link : <https://vjudge.net/problem/UVA-374>

My Code : <https://paste.ubuntu.com/p/fS4WjWMp2f/>

References :

1) Must read : <http://www.shafaetsplanet.com/?p=936>

2) CP-3 book section 5.5.8

3) Must watch : <https://youtu.be/-OPohCQqi_E>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 34 :**

Class Link : <https://youtu.be/r-P-2_kFRZE>

Discussed Topics:

1)Modular division and practice problems

2)Modular arithmetic template.

3) Bit String (CSES)

Problem Link : <https://cses.fi/problemset/task/1617>

My Code : <https://paste.ubuntu.com/p/q36n95QwZm/>

4) Combinations (Light Oj) :

Problem Link : <http://lightoj.com/volume_showproblem.php?problem=1067>

My Code : <https://paste.ubuntu.com/p/xDGwg2sGQ6/> (Normal) / <https://paste.ubuntu.com/p/BRd34DWDNx/> (With Template)

Resources :

Modular arithmetic template : <https://pastebin.com/pfmykJUn>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 35 :**

Class Link : <https://youtu.be/ZgIDaEI2WWM>

Discussed Topics:

1) Euler phi function

2) ETF - Euler Totient Function(SPOJ) :

Problem Link : <https://www.spoj.com/problems/ETF/>

My Code : <https://paste.ubuntu.com/p/KwQpW5G92d/>

Task :

3) Relatives (UVA)

Problem Link : <https://onlinejudge.org/index.php?option=com_onlinejudge&Itemid=8&page=show_problem&problem=1240>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 36 :**

Class Link : <https://youtu.be/EwJ00tB2lRk>

Discussed Topics:

1) Euler Phi Extension Theorem

2) Euler Phi Divisor Sum Theorem

Reference : <https://forthright48.com/euler-phi-extension-and-divisor-sum>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 37 :**

Class Link : <https://youtu.be/cf3jILTI8kI>

Discussed Topics:

1) Calculating euler phi from 1 to n in O(nln(n)) using harmonic series

2) Problem Name : Mathematically Hard (LightOJ)

Link : <http://lightoj.com/volume_showproblem.php?problem=1007>

My Code : <https://paste.ubuntu.com/p/G9P6PNZ976/>

Resource :

What is the value of 1^2+2^2+3^2+…n^2? : <https://www.quora.com/What-is-the-value-of-1-2+2-2+3-2+-n-2>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 37 :**

Class Link : <https://youtu.be/VBo04f_JU0o>

Discussed Topics:

1) Problem Name : Pairs Forming GCD (Codemarshal)

Link : <https://algo.codemarshal.org/contests/icpc-dhaka-19-preli/problems/G>

My Code : <https://paste.ubuntu.com/p/98mjXntWhk/>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 38 :**

Class Link : <https://youtu.be/VBo04f_JU0o>

Discussed Topics:

1) Problem Name : Pairs Forming GCD (Codemarshal)

Link : <https://algo.codemarshal.org/contests/icpc-dhaka-19-preli/problems/G>

My Code : <https://paste.ubuntu.com/p/98mjXntWhk/>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 39 :**

Class Link : <https://youtu.be/a3PoggC6hrg>

Discussed Topics:

1) Problem Name : LCM Sum (Spoj)

Link : <https://www.spoj.com/problems/LCMSUM/>

My Code : <https://paste.ubuntu.com/p/Pnfg86t4D3/>

Reference : <https://forthright48.com/spoj-lcmsum-lcm-sum>

Class Tasks :

All the problems discussed in class are class tasks.

**Class - 40 :**

Class Link : <https://youtu.be/nOkBfsTSNgg>

Discussed Topics:

1) Sum of Co-prime Numbers of an Integer

2) Euler’s Theorem

3) Fermat’s Little Theorem

4) Life of Phi (TopH) :

Link : <https://toph.co/p/life-of-phi>

My Code : <https://paste.ubuntu.com/p/pzRPtJWkYP/>

References :

Sum of Co-prime Numbers of an Integer : <https://forthright48.com/sum-of-coprime-numbers-of-integer>

Euler’s Theorem and Fermat’s Little Theorem : <https://forthright48.com/eulers-theorem-and-fermats-little-theorem/>

Class Tasks :

All the problems discussed in class are class tasks.

Class - 41:

Class Link:

<https://www.youtube.com/watch?v=U_RtnejWi7o&list=PLoa_roVVsxA1CJu4DsOljb9d7FJkMCynM&index=46>

**Discussed topics:**

1) Prime factorization of factorial and Legendre's formula

2) Divisors of the Divisors of an Integer(ICPC Dhaka Regional - 2018) (Problem C):

Problem PDF Link: <https://drive.google.com/file/d/16Ow9GDFNoaMoIWeAcqyKkW-RvVQ4qwR2/view>

OJ Link: <https://algo.codemarshal.org/login?next=/contests/icpc-dhaka-18/problems/C>

My Code: <https://paste.ubuntu.com/p/CBgXPRNBQf/>

Reference:

<https://forthright48.com/prime-factorization-of-factorial/\>

<https://en.wikipedia.org/wiki/Legendre%27s_formula#:~:text=In%20mathematics%2C%20Legendre's%20formula%20gives,formula%2C%20after%20Alphonse%20de%20Polignac>

**Class Tasks:**

All the problems discussed in class are class tasks.

Class - 42:

Class Link:

<https://www.youtube.com/watch?v=pezVJFxRR0Y&list=PLoa_roVVsxA1CJu4DsOljb9d7FJkMCynM&index=47>

**Discussed topics:**

1) Extended Euclidean Algorithm

2) Linear Diophantine Equation

Reference:

<https://forthright48.com/extended-euclidean-algorithm/>

<https://forthright48.com/linear-diophantine-equation/>

**Class Tasks:**

All the problems discussed in class are class tasks.