Course Objectives: To enable the students to

➢ Introduction to divisibility and prime numbers, arithmetical functions, notation and asymptotic equality of functions, Chebyshev's functions and their relations
➢ Understanding the concept of greatest common divisor (GCD), Mobius function and Euler quotient function, Euler's summation formula and asymptotic formulas, Shapiro's Tauberian theorem and its applications
➢ Learning the Euclidean algorithm for finding GCD, Exploring Dirichlet multiplication and its properties, the prime number theorem
➢ Investigating the divisor functions and generalized convolutions, sums of Dirichlet products and their identities, polynomial congruences modulo p and Lagrange's theorem.

Learning Outcomes:
   After successful completion of the course, students will be able to

➢ Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems

➢ Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study

➢ Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.

➢ understand the fundamental theorem of arithmetic and problem-solving skills
➢ understand Mobius function, Euler quotient function, The Mangoldt function, Liouville'sfunction, The divisor functions and the generalized convolutions.
➢ Understand Euler's summation formula, application to the distribution of lattice points andthe applications to μ (n) and Λ (n)
➢ Understand Shapiro's Tauberian theorem and its applications
➢ Understand residue classes and complete residue systems, application of Fermat's theorem and applications of Shapiro's theorem

<div align="center">

UNIT-I
The Fundament Theorem of Arithmetic

</div>

Introduction, Divisibility, Greatest common divisor, Prime numbers, The fundamental theorem of arithmetic, The series of reciprocals of the primes, The Euclidean algorithm, Thegreatest common divisor of more than two numbers (Chapter 1 of the Text Book)

UNIT-II
Arithmetical Functions and Dirichlet Multiplication

Introduction- The Mobius function μ (n) – The Euler quotient function φ (n) - A relation connecting φ and μ - A product formula for φ (n) - The Dirichlet product of arithmetical functions- Dirichlet inverses and the Mobius inversion formula- The Mangoldt functionΛ (n)- Multiplicative functions- Multiplicative functions and Dirichlet multiplication- The inverse of a completely multiplicative function-Liouville's function λ (n) - The divisor functions $\sigma\alpha$ (n) - Generalized convolutions.(Chapter-2:- Articles 2.1 to 2.14)

UNIT-III
Averages of Arithmetical Functions

Introduction- The big oh notation. Asymptotic equality of functions- Euler's summationformula- Some elementary asymptotic formulas-The average order of d(n)- The averageorder of the divisor functions $\sigma\alpha$ (n)- The average order of φ (n)- An application to thedistribution of lattice points visible from the origin- The average order of μ (n) and Λ(n)-The partial sums of a Dirichlet product- Applications to μ (n) and Λ (n)- Another identityfor the partial sums of a Dirichlet product.(Chapter -3:- Articles 3.1 to 3.12)

UNIT-IV
Some Elementary Theorems on The Distribution of Prime Numbers

Introduction- Chebyshev's functions ψ (x) and υ (x) - Relations connecting υ(x) and π(x) - Some equivalent forms of the prime number theorem-Inequalities for π (n) and P_n - Shapiro's Tauberian theorem- Applications of Shapiro's theorem- An asymptotic formulafor the partial sums $\Sigma p \leq x$ (1 / p) - The partial sums of the Mobius function. Chapter-4:- Articles 4.1 to 4.9

UNIT-V
Congruences

Definition and basic properties of congruences- Resudue classes and complete residue systems- Linear congruences- Reduced residue systems and the Euler- Fermat theorem- Polynomial congruences modulo p. Lagrange's theorem- Applications of Lagrage's theorem- Simultaneous linear congruences. The Chinese remainder theorem- Applicationsof the Chinese remainder theorem- Polynomial congruences with prime power moduli.
Chapter -5:- Articles 5.1 to 5.9

Activities:
1. Assignments
2. Student Seminars and Guest Lecturers
3. Problem Solving Sessions

Text Book:
Introduction to Analytic Number Theory- By T.M.APOSTOL- Springer
Verlag-New York,Heidalberg-Berlin-1976.

References :
1. G.A.Jones and J.M.Jones, Elementary Number Theory, Springer