

Lecture Plan		
Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa		
Name of Faculty: Aaron Alphonso	Subject: Mathematics	
Paper code: MAT-6001 Number Theory-II	Program: M.Sc. (Mathematics)	Division: -
Academic year: 2026-27	Semester: III	Total Lectures: 60
Course Objectives: 1. To introduce the foundational concepts of Number Theory, fostering a strong theoretical understanding of their definitions and properties. 2. To develop the learner's ability to construct and understand rigorous mathematical proofs related to key Number Theory concepts and theorems. 3. To equip learners with the skills necessary to identify and apply appropriate Number Theory methods and techniques to solve structured problems. 4. To encourage analytical thinking and creativity in solving unfamiliar problems in Number Theory, enabling learners to construct logically sound and precise mathematical arguments.		
Expected Course Outcome: 1) Display familiarity and knowledge of Number Theory and associated concepts. 2) Demonstrate proofs to establish truths related to Number Theory and associated concepts. 3) Choose the appropriate procedures, modify them if needed, and apply them to solve method-based problems in Number Theory. 4) Analyze and solve unseen problems in Number Theory and create mathematically precise arguments to justify their solutions. 5) Prove various results in Riemann integration. 6) Analyze and compare various number theoretic functions. 7) Examine the convergence of improper integrals.		
Student Learning Outcome: Student will be able to		

1) Prove key results in analytic and multiplicative number theory, including properties of arithmetical functions and prime distribution. 2) Apply arithmetical functions, character theory, and partition theory to solve structured and unseen problems in Number Theory. 3) Apply the theory of Riemann integration in evaluating integrals.							
Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books
June	22/06/2026	27/06/2026	4	Divisibility; Greatest common divisor; Prime numbers		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
	29/06/2026	04/07/2026	4	The Fundamental Theorem of Arithmetic; the series of reciprocals of primes		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
	06/07/2026	11/07/2026	2	The Euclidean Algorithm		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
July	13/07/2026	18/07/2026	4	Arithmetical functions and Dirichlet multiplication; Möbius function μ ; Euler totient function ϕ		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.

	20/07/2026	25/07/2026	4	Relation connecting μ and ϕ ; product formula for $\phi(n)$; Dirichlet product of arithmetical functions		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
Jul/Aug	27/07/2026	01/08/2026	4	Dirichlet inverse and Möbius inversion formula; Mangoldt function; multiplicative and Liouville functions; divisor functions; generalized convolutions; formal power series; Bell series; derivatives of arithmetical functions		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
August	03/08/2026	08/08/2026	4	Averages of arithmetical functions; Big-oh notation; Euler summation formula		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
	10/08/2026	15/08/2026	4	Some elementary asymptotic formulas; average order of $d(n)$		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
	17/08/2026	22/08/2026	4	Average order of $\sigma\alpha(n)$, $\phi(n)$, $\mu(n)$ and $\Lambda(n)$		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
	24/08/2026	29/08/2026	4	Elementary theorems on the distribution of prime numbers; Chebyshev's functions $\psi(x)$ and $\theta(x)$		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa

							Publishing House, 1998.
August/Sep t	31/08/2026	05/09/2026	3	Relations connecting the functions $\psi(x)$ and $\theta(x)$		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
Sep	07/09/2026	12/09/2026	4	Characters of finite abelian groups; the character group		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
	14/09/2026	19/09/2026	0	Ganesh Chaturthi Break (14–19 Sep)			
	21/09/2026	26/09/2026	3	The orthogonality relations of characters; Dirichlet character		Smart Board	T. M. Apostol, Introduction to Analytic Number Theory, Narosa Publishing House, 1998.
Sep/Oct	28/09/2026	03/10/2026	4	Partition Theory: partitions of numbers; generating function of $p(n)$		Smart Board	Thomas Koshy, Elementary Number Theory with Applications, 2nd Ed., Elsevier, 2005.
Oct	05/10/2026	10/10/2026	4	Other generating functions; theorem of Euler		Smart Board	Thomas Koshy, Elementary Number Theory with Applications, 2nd Ed., Elsevier, 2005.
	12/10/2026	14/10/2026	2	Theorem of Jacobi; special cases of Jacobi's identity		Smart Board	Thomas Koshy, Elementary Number Theory with

						Applications, 2nd Ed., Elsevier, 2005.
16/10/2026	17/10/2026	2	Basic Cryptology: Caesar Cipher, Shift Cipher, Affine Cipher, Hill Cipher		Smart Board	Thomas Koshy, Elementary Number Theory with Applications, 2nd Ed. (Ch. 9)

*** Assessment Rubrics**

Component	Max Marks
ISA 1	15
Mid Point Exam	30
ISA 2	15
Practical	Nil
Project	Nil
Semester End Exam	40