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-602 - NUMBER THEORY	**Program:** M.Sc. Mathematics	**Division: -**
Academic year: 2025-26	**Semester:** VI	**Total Lectures:** 60

Course Objectives: This course will serve as Prerequisites to an advanced Course in Analytical Number Theory

Expected Course Outcome: On completion of the course the student will be familiar with the topics in Number Theory

Student Learning Outcome: At the end of this course a student will be able to

1. **Recollect and explain various concepts in Number Theory**
2. **Prove important theorems in the course**
3. **Apply various concepts of Number Theory to solve problems.**
4. **Correlate various concepts in Number Theory and use them to solve problems.**

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books

December	1 Dec 2025	6 Dec 2025	1	Introduction to Number Theory	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
December	8 Dec 2025	13 Dec 2025	3	**Derivative of Function of more than one Variable:** Total derivative of a function of more than one Variable. Jacobian.	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
December	15 Dec 2025	20 Dec 2025	3	**Derivative of Function of more than one Variable:** Sufficient Condition for differentiability Mean Value Theorem. Higher-order derivatives.	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
January	22 Dec 2025	23 Dec 2025	1	**Derivative of Function of more than one Variable:** Condition for Equality of Mixed Partial Derivatives. Taylor's Theorem	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
January	2 Jan 2026	03 Jan 2023	4	**Derivative of Function of more than one Variable:** Problem Solving	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
January	05 Jan 2026	10 Jan 2026	4	**Extreme Values:** Critical Point, Maximum Minimum, Second	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic

				Derivative Condition for Maximum/minimu m			Number Theory
January	12 Jan 2026	17 Jan 2026	4	**Fundamental Theorem of Arithmetic:** Divisibility, Greatest common divisor, Prime numbers.	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
January	19 Jan 2026	24 Jan 2026	4	**Fundamental Theorem of Arithmetic:** The Fundamental Theorem of Arithmetic, The series of reciprocals of primes, The Euclidean algorithm.	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
January	26 Jan 2026	31 Jan 2026	4	**Arithmetical functions and Dirichlet multiplication:** IMobius function μ, Euler totient function φ, Relation connecting μ and φ, Product formula for φ (n).	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
February	02 Feb 2026	07 Feb 2026	4	**Arithmetical functions and Dirichlet multiplication:** Dirichlet product of arithmetical functions, Dirichlet inverse and Mobius	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory

				inversion formula, Mangoldt function, Multiplicative functions.			
February	09 Feb 2025	14 Feb 2025	4	**Arithmetical functions and Dirichlet multiplication:** Liouville function, Divisor functions, Generalized convolutions, Formal power series, Bell series. Derivative of arithmetical functions.	Problem Solving	Laptop, Smart Board and writing pad	Tom Apostol, Introduction to Analytic Number Theory
February	16 Feb 2025	21 Feb 2026	4	**Averages of arithmetical functions:** Big oh notation. Euler summation formula.	Problem Solving	Laptop, Smart Board	Mathematical Analysis by Tom Apostol
February	23 Feb 2026	28 Feb 2026	4	**Averages of arithmetical functions:** Some elementary asymptotic formulas. Average order of d(n).	Problem Solving	Laptop, Smart Board	Mathematical Analysis by Tom Apostol
March	02 Mar 2026	07 Mar 2026	4	**Averages of arithmetical functions:** Average order of $\sigma\alpha(n)$, Average order of φ (n), Average order of $\mu(n)$ and $\Lambda(n)$.	Problem Solving	Laptop, Smart Board	Mathematical Analysis by Tom Apostol
March	09 Mar 2026	14 Mar 2026	4	**Some elementary theorems on distribution of prime**	Problem Solving	Laptop, Smart Board	Mathematical Analysis by Tom Apostol

				numbers: Chebyshev's functions $\mathsf{P}(x)$ and $f(x)$. Relations connecting functions $\mathsf{P}(x)$ and $f(x)$ **Characters of finite abelian groups:** Characters of finite abelian groups, The character group, The orthogonality relations of characters, Dirichlet character.			
March	16 Mar 2026	21 Mar 2026	4	**Partition Theory**: Partitions of numbers, Generating function of p(n), Other generating functions, Theorems of Euler, Theorem of Jacobi, Special cases of Jacobi's identity.	Problem Solving	Laptop, Smart Board	Mathematical Analysis by Tom Apostol
March	23 Mar 2026	28 Mar 2026	4	**Basic Cryptology:** Caesar Cipher. Shift Cipher. Affine cipher. Hill cipher.	Problem Solving	Laptop, Smart Board	Mathematical Analysis by Tom Apostol
March - April	30 Mar 2026	04 Apr 2026	4		Problem Solving	Laptop, Smart Board	Mathematical Analysis by Tom Apostol

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*** Assessment Rubrics**

Component	Max Marks
ISA 1	20
ISA 2	20
ISA 3	20
ISA 4	20
Semester End Exam	40