Indraprastha College for Women
University of Delhi

Course Name:	B.A.(Prog.)
Paper Title:	Number Theory
Unique Paper Code:	
Semester:	V
Faculty(s):	Dr. Gunjan Khurana
Year:	2024-2025

Work Plan

Period	Unit No.	Learning Objective	Topics to be Covered
1st Aug -3rd Aug	1	The Euclidean algorithm and linear Diophantine equations, the Fundamental theorem of arithmetic and some of the open problems of number theory viz. the Goldbach conjecture.	The division algorithm, divisibility and the greatest common divisor
5th Aug-10th Aug	1	Same as above	Euclid's lemma; The Euclidean algorithm, Linear Diophantine equations
12th Aug-17th Aug	1	Same as above	The Fundamental theorem of arithmetic, The sieve of Eratosthenes
19th Aug-24th Aug	1	Same as above	Euclid's theorem and the Goldbach conjecture; The Fibonacci sequence and its nature
26th Aug-31st Aug	2	The modular arithmetic, linear congruence equations, system of linear congruence equations, arithmetic functions, and multiplicative functions, e.g., Euler's Phi-function.	Congruence relation and its basic properties

2nd Sep-7th Sep	2	Same as above	Linear congruences and the Chinese remainder theorem,
9th Sep-14th Sep	2	Same as above	System of linear congruences in two variables
16th Sep-21st Sep	2	Same as above	Fermat's little theorem and its generalization
23rd Sep-28th Sep	2	Same as above	Wilson's theorem and its converse
30th Sep-5th Oct	2	Same as above	Number-theoretic functions for sum and the number of divisors of a positive integer
7th Oct-12th Oct	2	Same as above	Multiplicative functions
14th Oct-19th Oct	2	Same as above	The greatest integer function; Euler's phi-function and its properties
21st Oct-26th Oct	3	Introduction of the simple encryption and decryption techniques, and the numbers of specific forms viz. Mersenne numbers, Fermat numbers etc.	Basics of cryptography, Hill's cipher
28th Oct-2nd Nov	3	Same as above	MID SEMESTER BREAK
4th Nov-9th Nov	3	Same as above	Public-key cryptosystems and RSA encryption and decryption technique
11th Nov-16th Nov	3	Same as above	Introduction to perfect numbers
18th Nov-23rd Nov	3	Same as above	Mersenne numbers and Fermat numbers
25th Nov-27th Nov		Same as above	Revision
28th Nov	DISBERSAL OF CLASSES		

Unit	TOPICS
I	Divisibility and Prime Numbers (12 hours) Revisiting: The division algorithm, divisibility and the greatest common divisor. Euclid's lemma; The Euclidean algorithm, Linear Diophantine equations; The Fundamental theorem of Arithmetic, The sieve of

	Eratosthenes, Euclid theorem and the Goldbach conjecture; The Fibonacci sequence and its nature.
II	Theory of Congruences and Number-Theoretic Functions (21 hours) Congruence relation and its basic properties, Linear congruences and the Chinese remainder theorem, System of linear congruences in two variables; Fermat's little theorem and its generalization, Wilson's theorem and its converse; Number-theoretic functions for sum and the number of divisors of a positive integer, Multiplicative functions, The greatest integer function; Euler's Phi-function and its properties.
III	Public Key Encryption and Numbers of Special Form (12 hours) Basics of cryptography, Hill's cipher, Public-key cryptosystems and RSA encryption and decryption technique; Introduction to perfect numbers, Mersenne numbers and Fermat numbers.

S. No.	**Name of Authors/Books/Publishers**
1.	Burton, David M. (2011). Elementary Number Theory (7th ed.). McGraw-Hill Education Pvt. Ltd. Indian Reprint 2017.
2.	Jones, G. A., & Jones, J. Mary. (2005). Elementary Number Theory. Undergraduate Mathematics Series (SUMS). Indian Reprint.
3.	Robbins, Neville (2007). Beginning Number Theory (2nd ed.). Narosa Publishing House Pvt. Ltd. Delhi.
4.	Rosen, Kenneth H. (2011). Elementary Number Theory and its Applications (6th ed.). Pearson Education. Indian Reprint 2015.