



A BASIC COURSE IN NUMBER THEORY

PROF. SHRIPAD GARGE

Department of Mathematics
IIT Bombay

TYPE OF COURSE : New | Elective | PG

COURSE DURATION : 12 weeks (20 Jul' 20 - 9 Oct' 20)

EXAM DATE : 18 Oct 2020

PRE-REQUISITES : Knowledge of basic group theory and ring theory will be useful but it is not necessary.

INTENDED AUDIENCE : Students with basic knowledge of Mathematics can take this course.

COURSE OUTLINE :

This course intends to develop the basics of number theory touching upon many essential points such as the prime number theorem, quadratic reciprocity laws, Gauss' theorem on the classification of binary quadratic forms, Brahmagupta-Pell equations, to quote a few. This course will enable a student to learn more advanced topics in number theory.

ABOUT INSTRUCTOR :

Prof. Dipendra Prasad, an Assistant Professor at the Mathematics department, IIT Bombay. His research interests are in Group Theory and Number Theory.

COURSE PLAN :

Week 1: Factorization of numbers, primes

Week 2: GCD, Euclid's algorithm, properties of primes

Week 3: Arithmetical functions, examples,

Week 4: Dirichlet product, Möbius inversion

Week 5: Congruences, Chinese remainder theorem, primitive roots,

Week 6: Quadratic reciprocity law, applications

Week 7: Binary quadratic forms, Gauss' theory of reduced forms

Week 8: Sums of two squares, sums of four squares

Week 9: Diophantine approximation, theorems of Dirichlet and Liouville

Week 10: Continued fractions, quadratic irrationals

Week 11: Quadratic extensions of rationals, units in the rings of integers

Week 12: Diophantine equations with special reference to Brahmagupta-Pell equation