

ABSTRACT

The main focus in this thesis is to study the different properties of Pythagorean triples, to find triples with sum of any two coordinates is some fixed power, finite sum of polynomial expressions, triangular numbers, pseudoprimes and some primality testing.

In chapter 1 we have discussed some basics and known results in Number Theory which are essential for the our research work.

In chapter 2 we have discussed nonexistence of Pythagorean triples in terms of harmonic progression. Also we have proved the irrationality of real numbers with the help of some results on Pythagorean triples. We have discussed some basics regarding congruent numbers. In chapter 3, we have discussed finding of the triplets of positive integers with sum of any two coordinates to be some fixed power of positive integer. We find infinitely many such triples. Also with the help of taxicab numbers we have proved the existence of four tuples of positive integers with sum of any two coordinates is a cube of a positive integer.

In chapter 4 we have developed very simple techniques for finding the finite sum of polynomial expressions like Integral Technique, Differentiation Technique and Forward Difference Technique. In chapter 5, we have proved that any three consecutive triangular numbers do not form a Pythagorean triple. We have discussed the convergence of the series which contains reciprocals of p th powered triangular numbers. Using the techniques developed in chapter 4 for finite sum of polynomial expressions, we have discussed the finite series of triangular numbers. We have studied ratio of some triangular numbers. Also we find unit digits of triangular numbers.

Chapter 6 is a review based chapter. We have discussed the known results on pseudoprimes, Carmichael numbers, strong pseudoprimes and Euler pseudoprimes. We have also proved some numbers are Carmichael numbers with the help of known results. Also we have discussed Fermat's numbers and Mersenne numbers in terms of pseudoprimes. We have discussed Carmichael numbers in terms product of some particular types of prime numbers. Also we have discussed Euler pseudoprimes in terms of strong pseudoprimes.