Abstract

The main theme of this thesis centers around the consideration of p-adic numbers as sequences and the subsequent inception of the concept of Weight Function, Carry-out Sequences, Negative Annihilator and Geometrical Layout for the distribution of rational integers in the ring of p-adic integers.

More specifically, first, we develop a new concept in the form of Weight Function in analogous to the valuation function. The framework is so developed that one might find himself enlightened to work with this new concept. This concept ultimately leads the way to partition the p-adic numbers into equinorm equivalence classes. The distribution of rational integers in the ring of p-adic integers could be realised with the help of equinorm equivalence classes.

Second, an effort has been made to visualize the distribution of rational integers in the ring of p-adic integers $\Omega_p$. It has been observed that the geometrical aspects of p-adic numbers have not received serious attention from the researchers across the globe even though the p-adic integers and their subsequent development up to the field $\Omega$ of p-adic numbers have extensively been studied. As a result of this, some basic assertions relating to triangles and balls in non-Archimedean analysis stand as a surprise package for a beginner. For instance, we observe that every triangle is isosceles here and every open (or closed) ball (disc) is independent of its centre, that is, if $S(a, r)$ is an open ball and $b \in S(a, r)$ then $S(a, r) = S(b, r)$.

A much more conducive environment could have been provided if we could refer some concrete geometrical layout for p-adic numbers in support of the results as mentioned above. Besides, such geometrical layout for p-adic numbers will supply a lot of informations behind a result from geometrical perception. The epitome of this piece of work rests on the geometrical layout to be provided which have been an endeavour in course of our entire study.
Third, our effort has come to reality as we have attempted to develop the concept of 
*Carry-out Sequences* in connection with addition, multiplication etc. In course of the study, 
the development of the concept of *Carry-out Sequences* comes into the force, because we 
consider $p$-adic numbers as sequences. *Carry-out Sequences* play a pivotal role in tracing out 
the existence of the inverse of a $p$-adic number. Some interesting properties pertaining to the 
*Carry-out Sequences* have been developed and thereby formulated the algebraic structure of 
the $p$-adic integers.

Fourth, we present the concept *Negative Annihilator* which helps in finding negative of 
a $p$-adic number readily. One would realise the utility of the *Negative Annihilator* during 
the process of determination of the negative of a $p$-adic number in comparison to that of the 
usual method.

Lastly, we have tried to concentrate on the determination of the rational integers as repre­
sentatives of some equivalence classes of $p$-adic numbers having recurred inverses with a 
recurred set independent of the prime $p$. Because of the introduction of two new concepts: 
*Recurred and Functionally Recurred* $p$-adic numbers reflect the role of Diophantine equations 
in the determination of the inverses of $p$-adic numbers.