ABSTRACT

Title: Different aspects of complex valued functions of higher dimension
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The prime concern of the present thesis focuses on some investigation and exploration covering various aspects of higher dimensional complex valued functions.

The thesis consists of Eight Chapters.

Chapter One deals with the preliminaries of hybrid as well as hyperbolic hybrid numbers and also their flavour on certain types of probabilistic measurable spaces. Also the introductory theories concerning the influence of higher dimensional complex valued functions in Nevanllina's Value distribution theories mainly both p-adic analysis and bicomplex analysis are briefly discussed in this chapter.

In **Chapter Two**, we define a new notion of sets, termed as symmetric hybrid number & skew symmetric hybrid number and study some of their algebraic properties. The key result of this chapter is to establish that the set of non-lightlike hybrid number forms a non-abelian group under multiplication and also to find a normal subgroup of it. Moreover, the existance of subrings and also their ideals is the prime concern under some additional conditions.

The prime concern of **Chapter Three** is to introduce a notion of a hyperbolic hybrid valued probabilistic measurable space to generalize 'Kolmogorov's system of axioms'. The probability which we define here may take values e_+ and e_- for the certain event other than 1 which is the key difference from the probability in $\mathbb{R}$, where e_+ and e_- are very special kind of zero divisors in the ring of hybrid numbers. In this work we also prove the usual properties of probability theory like extended addition theorem, Boole's inequality, continuity theorem, Bonferroni's inequalities etc. by this new measure.

Chapter Four focuses on the study of the conditional probability under the flavor of hyperbolic hybrid valued probabilistic measurable space, a generalization of 'Kolmogorov's system of axioms'. We prove the well known result 'Multiplication Theorem' in this probabilistic space and then generalize it in this context. In this work we also extend the *Bayes' theorem* and the law of total of probability by this new measure.
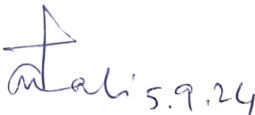
In **Chapter Five**, we consider $\mathbb{T}$ as an algebraically closed p-adic complete field of characteristic zero. We define L^*-order of growth $\rho^{L^*(\psi)}$ and L^*-type $\sigma^{L^*}(\psi)$ of an entire function $\psi(\omega) = \sum_{n=0}^{\infty} c_n \omega^n$ on $\mathbb{T}$ and show that $\rho^{L^*(\psi)}$ and $\sigma^{L^*}(\psi)$ satisfy the same relations as in complex analysis with regards to the coefficients c_n. We denote L^*-cotype of ψ by $\psi^{L^*}(\psi)$ depending on the number of zeros inside the disks is very useful

and we show under certain wide hypothesis $\psi^{L^*}(\psi) \geqslant \rho^{L^*}(\psi).\sigma^{L^*}(\psi)$. We check that $\rho^{L^*}(\psi) = \rho^{L^*}(\psi'),\ \sigma^{L^*}(\psi) = \sigma^{L^*}(\psi')$, where ψ' is the derivative of ψ.
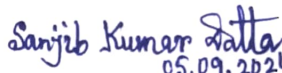
The main goal of **Chapter Six** is to prove the bicomplex version of Enström-Kakeya theorem [if $P(z) = \sum_{(} k = 0)^n a_k z^k$ is a polynomial of degree n with real coefficients satisfying $0 \leqslant a_1 \leqslant a_2 \leqslant \cdots \leqslant a_n$, then all zeros of $P(z)$ lie in $|z| \leqslant 1$] and some of its consequences. Some examples are provided to justify the results obtained.

Chapter Seven is about the investigation of some common fixed point theorems in bicomplex valued metric spaces under both rational type contraction mappings satisfying E. A. property and intimate mappings. Our results generalize some earlier results (Rajput & Singh, 2014; Meena, 2015) and extend some existing theorems (Azam et al., 2011; Rouzkard & Imdad, 2012) regarding common fixed point theorems in complex valued metric spaces. A few examples are also provided to justify the results obtained.

Chapter Eight is mainly based on future prospects including further course of work and also their applications of the works as carried out in the thesis.

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