ABSTRACT

Title: SOME STUDY ON HIGHER DIMENSIONAL COMPLEX ANALYSIS AND GEOMETRY

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The prime concern of the present thesis focuses on discussions and exploration covering different aspects of complex analysis and geometry of higher index.

The thesis consists of Eight Chapters.

Chapter One deals with the preliminaries of bicomplex numbers, p-adic numbers and complex manifold. Also, the introductory theories concerning the influence of higher dimensional complex valued functions in Nevanlinna's Value distribution theories mainly both p-adic analysis and bicomplex analysis are briefly discussed in this chapter.

The prime concern of **Chapter Two**, is to prove some common fixed point theorems for converse commuting self-maps for non-complete bicomplex valued metric spaces. Our results are the generalizations of the results of Chauhan & Sahper (2013) and Kumar et al. (2014). Moreover, we wish to investigate some common fixed point theorems in bicomplex valued b-metric spaces satisfying some rational inequalities for a pair of self contracting mappings and extend some theorems of Azam et. al. (2011) and Rouzkard & Imdad (2012) regarding common fixed point theorems in complex valued metric spaces.

The main purpose of **Chapter Three** is to establish another representation of order and lower order of $f \in \mathfrak{A}(\mathcal{K})$ where $\mathcal{K}$ is a complete ultametric algebraically closed field and $\mathfrak{A}(\mathcal{K})$ is the $\mathcal{K}$-algebra of entire functions on $\mathcal{K}$. Here, we establish the integral representation of generalized (β, γ)-th relative type and generalized (β, γ)-th relative weak type of entire function f with respect to another entire function g, where f, $g \in \mathfrak{A}(\mathcal{K})$ and their equivalence relation under some certain conditions are also obtained.

The main goal of **Chapter Four** is to establish some results focusing on the comparative growth properties of composition of two k-valued entire algebroidal functions in terms of their relative growth indicators from the view point of slowly changing functions in the light of p-adic analysis. Although the main aim of this chapter is to find out the estimates of relative (β, γ)-th type, relative (β, γ)-th lower type and relative (β, γ)-th weak type under somewhat different conditions where p and q are any two positive integers via the concept of p-adic analysis of entire algebroidal functions.

The **Chapter Five** aims to extend the classical Enström-Kakeya theorem for entire functions of non zero finite order having lacunary type power series expansion. A few examples with related figures are given here to justify the results obtained. We

investigate some common fixed point theorems in bicomplex valued metric space and find some sufficient conditions for the existence of common fixed points for a pair of self contracting mappings.

Chapter Six is focused on the derivation of some results related to the distribution of zeros of bicomplex valued entire functions in a certain domain. Some examples are provided to justify the results obtained.

The nucleus of **Chapter Seven** is to derive some results related to the Bicomplex manifold, almost bicomplex manifold, almost bicomplex Hermite manifold and to discuss some properties of Nijenhuis tensor, contravariant almost analytic vector fields etc.

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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