

Abstract of Ph. D. thesis

# Common Fixed Point Theorems in $G$ -metric Spaces

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Recently, there has been a significant advancement in fixed point theory, largely attributed to the emergence of novel auxiliary functions and modifications in the metric space axioms. The first method is used to express different contractivity conditions in a simple and unified way while the second method is used to prove common fixed point results in generalized metric spaces. Based on the above utility, the mentioned two concepts were extended in many ways. The purpose of this thesis is to generalize the contractive condition in  $G$ -metric spaces and find sufficient conditions for the existence and uniqueness of coincidence and common fixed points. For this purpose, a generalized cyclic contraction and rational type cyclic contraction via  $C$ -class function in  $G$ -metric spaces are introduced using auxiliary functions and study the existence of common fixed points. Later on, Ćirić type  $Z_F$ -contraction and the generalized Ćirić type  $(Z_{(\alpha,F)}, S)$ -contraction for a pair of mappings are introduced using the notion of  $C_F$ -simulation functions in the context of quasi-metric spaces. Further,  $(\psi, \phi)$ -Wardowski contraction for three maps in the setting of  $G_b$ -metric spaces is introduced. Also established the condition for which the common fixed point is a point of discontinuity that has applications in neural networks. Finally, we introduce the extended  $\gamma - C_F$ -simulation functions and the generalized  $\gamma - C_F$ -simulation functions which are extensions of the simulation functions. We investigate its application in integral equations.