Abstract

The study of fixed point theory in various abstract spaces is one of the most fascinating and interesting branch of modern mathematics. This branch becomes very famous due to its versatile applications in nonlinear analysis, fractional derivative, game theory, matrix analysis, nonlinear integral equation, dynamical system, mathematical physics, and engineering problems etc. The main aim of this thesis is to study fixed point results by using different types of contractions in various abstract spaces like b−metric spaces, c−distance, G_b−metric spaces, wt−distance, doubled controlled metric like spaces etc. This thesis is distributed into nine chapters, including a chapter devoted to concluding remarks and scope for future work.

Chapter 1 is the introductory chapter, where we represent some mathematical background that is required in our thesis along with an adequate literature survey on fixed point theory. In Chapter 2, we extend the famous result of Berinde and Borcut from tripled coincidence point to quadruple coincidence point by using the concept of c-distance under partially ordered cone metric spaces. In Chapter 3, we have studied weak contractive conditions by involving weak α_w-admissible mappings in G_b−metric spaces. By using C-class functions and α-admissible mappings, Berinde type mappings have been investigated in Chapter 4 in the context of complete metric spaces. Next two chapters, deal with *wt*-distances. In Chapter 5, we have extended the famous results of Lakzian-Rhoades from *w*-distance to *wt*-distance by involving two self mappings in partially ordered *b*-metric spaces. We have introduced the concepts of α-admissible mappings associated with δ for two mappings in Chapter 6. In this chapter, we have also studied implicit relations, $(\eta, \theta, \mathcal{Z}, \phi)_\beta$ contractions, and Caristi type $(\alpha - \Omega - \mathcal{Z})$-contractions. Chapter 7 deals with graphical set-valued $(\mathcal{F}, \mathcal{H})$- contractions by using rational terms in b-metric spaces. In the same chapter, we have also discussed some stability results for such mappings. In Chapter 8, we have established some new fixed point results by using implicit relations and $(\mathcal{F}, \mathcal{H})$-contractions in the set up of newly introduced doubled controlled metric like spaces (in brief DCMLS).

Keywords: Fixed point; Multivalued map; c−distance; b−metric space; G_b-metric space; wt−distance; Doubled controlled metric like space; Admissible mapping; $(\mathcal{F}, \mathcal{H})$-contraction; $(\eta, \theta, \mathcal{Z}, \phi)_\beta$-contraction, Caristi-type $(\alpha - \Omega - \mathcal{Z})$ contraction; Implicit relation; C-class function; Nonlinear integral equation, Spring mass system; Nonlinear matrix equation.