

Contents

List of Figures	xii
List of Tables	xiii
Notations and Symbols	xv
1 Introduction	1
1.1 Topological fixed point theory	1
1.2 Metric fixed point theory	3
1.2.1 Extension of the Banach contraction principle	5
1.2.2 Non-triangular metric space	8
1.3 Non-expansive mapping in the Banach space	10
1.3.1 The technique of enriching non-expansive mapping	12
1.4 Non-expansive mapping in the quasi-Banach space	14
1.5 Generation of fractals	17
1.6 Motivation and Objective of the Thesis	19
2 Ćirić quasi-contraction operators with common fixed point results	21
2.1 Introduction	21
2.1.1 Delineation	23
2.2 Common fixed point results	24
2.3 An application to nonlinear variational inequality problems	32
2.4 Concluding remarks	34
3 Fixed point theorems for enriched Ćirić quasi-contraction map in the Banach and convex metric spaces	37
3.1 Introduction	37
3.1.1 Delineation	38
3.2 Enriched Ćirić quasi-contraction in Banach space	38
3.2.1 Numerical illustration	43
3.3 Enriched Ćirić quasi-contraction in the convex metric space	43
3.4 Enriched cyclic Ćirić quasi-contraction in the Banach space	49

3.5	Concluding remarks	54
4	Approximating fixed point results for pseudo-contractive map in the Banach space	55
4.1	Introduction	55
4.1.1	Delineation	56
4.2	Convergence results for Krasnoselskii-Mann iteration	57
4.2.1	Convergence results for modified Krasnoselskii-Mann iteration	60
4.2.2	Numerical illustration	62
4.3	Unsaturated class of contractive mappings	65
4.4	Concluding remarks	67
5	Approximating fixed point results for enriched Ćirić-Reich-Rus contraction and enriched Kannan contraction in quasi-Banach space	69
5.1	Introduction	69
5.1.1	Delineation	70
5.2	Enriched Ćirić-Reich-Rus contractions in the quasi-Banach space	71
5.3	Enriched Kannan contraction in the quasi-Banach space	76
5.4	Maia-type fixed point theorems	77
5.5	Concluding remarks	82
6	Proinov contraction in the non-triangular metric space	83
6.1	Introduction	83
6.1.1	Delineation	85
6.2	Proinov contraction in non-triangular metric space	86
6.3	Extended Proinov contractions in the non-triangular metric space	89
6.4	An application to homogeneous Fredholm integral equation	94
6.5	Concluding remarks	96
7	Generation of fractals by Φ-iterated tupling system	97
7.1	Introduction	97
7.1.1	Delineation	98
7.2	Strong m -tuple fixed point result	99
7.3	Generation of strong m -tuple fractals	104
7.4	Concluding remarks	109
8	Conclusions and Future Remarks	111
8.1	Conclusions	111
8.2	Some Future Directions	112