

TABLE OF CONTENTS

SELF DECLARATION AGAINST PLAGIARISM	iii
ABSTRACT	iv
ABSTRAK.....	v
DEDICATION	vi
ACKNOWLEDGMENTS.....	vii
TABLE OF CONTENTS	viii
LIST OF TABLES.....	xi
LIST OF FIGURES	xii
LIST OF ABBREVIATIONS.....	xiv
CHAPTER 1: PROBLEM INTRODUCTION	1
1. Introduction.....	1
1.1 Background.....	1
1.2 Theoretical Framework.....	4
1.3 Conceptual Framework.....	5
1.4 Problem Statement	6
1.5 Hypothesis.....	6
1.6 Assumptions.....	7
1.7 Scope and Limitation.....	8
CHAPTER 2: LITERATURE REVIEW AND STUDIES	9
2.1 Theory Overview	9
2.1.1 Microstrip Antenna.....	9
2.1.2 Metamaterial Split Ring Resonator.....	11
2.1.3 Metasurface.....	14

2.1.4	Nylon-6 Spacers	15
2.1.5	<i>State of The Art</i>	16
CHAPTER 3: RESEARCH METHODOLOGY.....		18
3.1	Research Design	18
3.1.1	Research Products	18
3.1.2	Design Scenario	19
3.2	Population/Sampling	20
3.3	Instrumentation and Data Collection.....	20
3.4	Tools for Data Analysis	22
3.5	Microstrip Antenna.....	23
3.5.1	MPA Patch Dimensions.....	23
3.5.2	Substrate Dimensions	25
3.5.3	Groundplane Dimensions	25
3.5.4	Feedline Dimensions	26
3.6	RSRR Metamaterials.....	29
3.7	Antena Metasurface.....	31
3.8	System Testing Scheme	32
CHAPTER 4: DATA PRESENTATION AND ANALYSIS		35
4.1	Data Presentation	35
4.1.1	Microstrip Antenna Simulation	35
4.1.2	RSRR Metamaterials Simulation	38
4.1.3	Metasurface Antenna Simulation	40
4.1.3.1	Adjustment 1 Length and Width of RSRR	42
4.1.3.2	Adjustment 2 Length and Width of RSRR	45
4.1.3.3	Adjustment 3 Length and Width of RSRR	47

4.1.3.4	Adjustment 4 Gap Cut on RSRR	50
4.1.3.5	Adjustment 5 Inner RSRR width	53
4.1.3.6	Adjustment 6 Gap Between RSRRs in the y-axis.....	55
4.1.3.7	Selected Antennas and Frequency Tuning.....	57
4.1.4	Fabrication of selected antennas	64
4.1.5	Measurement of Microstrip Antenna	66
4.1.6	Metasurface Antenna Measurements	69
4.2	Data Analysis	72
4.3	Summary of Findings	82
CHAPTER 5 : CONCLUSIONS AND RECOMMENDATIONS.....		83
5.1	Conclusion.....	83
5.2	Recommendation	84
5.3	Achievements	84
REFERENCE.....		86
APPENDIX		91