CONTENTS		
	Page No.	
List of Figures	xiv-xx	
List of Tables	xxi-xxii	
List of Abbreviations	xxiii- xxiv	
Preface	xxv- xxviii	
CHAPTER 1 Introduction and Scope of the Thesis	1-28	
1.1 Introduction	1	
1.2 Microwave Filters	2	
1.2.1 Introduction	2	
1.3 Antenna Theory	6	
1.3.1 Introduction	6	
1.3.2 Planar Monopole Antennas	6	
1.4 Review of Some State-of-The-Art Research Studies on Microstrip Filters, Monopole Antennas, and Filtering Antennas	9	
1.4.1 Review on Microstrip Filters	9	
1.4.2 Review on Monopole Antennas	15	
1.4.3 Review on Filtering Antennas	17	
1.5 Motivation and Problem Definition	19	
1.6 Objectives of the Proposed Research Work	20	
1.7 Scope of the Thesis	23	
CHAPTER 2 Compact Wideband Interdigital Bandpass Filter (IBPF) and its Modification Using Spurlines and Defected Ground Structures (DGSs)	29-44	
2.1 Introduction	29	
2.2 Design and Study of Conventional Interdigital Bandpass Filter (IBPF)	30	
2.2.1 Design of Conventional IBPF	30	

2.2.2 Results and Discussion	32
2.3 Design and Investigation of the Proposed Modified IBPF	33
2.3.1 Spurline – Theory and Equivalent Circuit	34
2.3.2 IBPF with One Pair of Spurlines	35
2.3.3 IBPF with Two Pairs of Spurlines	36
2.3.4 Stepped Impedance Resonator (SIR)-shaped Defected Ground Structure (DGS) – Theory and Equivalent Circuit	37
2.3.5 The Proposed BPF (IBPF with Spurlines and SIR- shaped DGSs)	39
2.3.5.1 Geometry of the Proposed BPF	39
2.3.5.2 Results and Discussion	41
2.4 Conclusion	43
CHAPTER 3 Compact Filtering Antenna with High Selectivity and Improved Performance for L-band Applications	45-68
3.1 Introduction	45
3.2 Proposed Modified Elliptic-shaped Monopole Antenna (MPA)	47
3.2.1 Design and Investigation of the Proposed Antenna	47
3.2.2 Results and Discussion	52
3.2.2.1 Reflection Coefficient-Frequency Characteristics	52
3.2.2.2 Radiation Patterns and Peak Realized Gain- Frequency Characteristics	53
3.2.2.3 Simulated Total Efficiency-Frequency Characteristic	55
3.2.2.4 Performance Comparison of the Proposed Antenna with Those Reported in Literature	55
3.3 The Modified Interdigital Bandpass Filter (IBPF)	56
3.3.1 Design of the Modified IBPF	56
3.3.2 Results and Discussion	57
3.4 Proposed Filtering Antenna	59
3.4.1 Design and Investigation of the Proposed Filtering Antenna	59
3.4.2 Results and Discussion	60
3.4.2.1 Reflection Coefficient-Frequency Characteristics	60

3.4.2.2 Simulated Surface Current Distributions	61
3.4.2.3 Radiation Patterns	63
3.4.2.4 Peak Realized Gain-Frequency Characteristics	63
3.4.2.5 Simulated Total Efficiency-Frequency Characteristic	64
3.4.2.6 Performance Comparison of the Proposed Filtering Antenna with Those Reported in Literature	66
3.5 Conclusion	67
CHAPTER 4 Compact Ultra-wideband Bandpass Filter with Improved Performance Using Defected Ground Structure-based Lowpass Filter	69-112
4.1 Introduction	69
4.2 Design and Study of the Multi-mode Resonator (MMR)-based Ultra-wideband (UWB) Bandpass Filter (BPF)	71
4.2.1 Investigation of the MMR-based UWB BPF	71
4.2.2 Equivalent Circuit of the MMR-based UWB BPF	72
4.2.3 Results and Discussion of the MMR-based UWB BPF	75
4.3 Design and Investigation of the Modified MMR-based UWB BPF	76
4.3.1 Design of the Modified MMR-based UWB BPF	76
4.3.2 Equivalent Circuit of the Modified MMR-based UWB BPF	78
4.3.3 Results and Discussion	79
4.4 Defected Ground Structure (DGS)-based Lowpass Filter (LPF)	80
4.4.1 Introduction	80
4.4.2 Single Isosceles U-shaped DGS (UDGS)	83
4.4.2.1 Analysis and Modelling of Single Isosceles U-shaped DGS	83
4.4.2.2 Parametric Study of Single Isosceles U-shaped DGS	85
4.4.2.3 Performance Comparison of the Proposed Single Isosceles U-shaped DGS with Dumbbell- and Fork- shaped DGSs	86
4.4.3 Triple Isosceles U-shaped DGS (Proposed DGS Unit)	87
4.4.3.1 Design and Analysis of Triple Isosceles U-shaped	87

DGS

4.4.3.2 Parametric Study	90
4.4.3.3 Equivalent RLC Circuit Model	
4.4.3.4 Numerical and Circuit Simulation Results	94
4.4.4 DGS-based LPF (the Proposed LPF)	95
4.4.4.1 Design of DGS-based LPF	95
4.4.4.2 Numerical Simulation Study	97
4.4.4.3 RLC Circuit Modelling and Analysis of the Proposed LPF	99
4.4.4.4 Experiments, Results and Discussion for the Proposed LPF	101
4.4.4.5 Performance Comparison of the Proposed LPF with the LPFs Reported in the Literature	103
4.5 Proposed UWB BPF (Modified MMR-based UWB BPF Integrated with DGS-based LPF)	103
4.5.1 Design and Investigation of the Proposed UWB BPF	103
4.5.2 Equivalent Circuit Model of the Proposed UWB BPF	106
4.5.3 Simulated Surface Current Distributions	107
4.5.4 Experiments, Results and Discussion	
4.5.5 Performance Comparison of the Proposed UWB BPF with the BPFs Reported in the Literature	111
4.6 Conclusion	111
CHAPTER 5 Compact Ultra-wideband Filtering Antenna with High Selectivity and Improved Performance	113-146
5.1 Introduction	113
5.2 Proposed Compact UWB Monopole Antenna	116
5.2.1 Design and Investigation of the Proposed UWB Antenna	116
5.2.2 Results and Discussion	122
5.2.2.1 Reflection Coefficient-Frequency Characteristics	122
5.2.2.2 Radiation Patterns and Peak Realized Gain- Frequency Characteristics	123
5.2.2.3 Simulated Total Efficiency-Frequency Characteristic	125

5.2.2.4 Time Domain A	nalysis	126
	omparison of the Proposed UWB hose Reported in Literature	128
5.3 Ultra-wideband (UWB) E	Sandpass Filter (BPF)	129
5.3.1 Design of UWB BPF		129
5.3.2 Results and Discussion		130
5.4 Proposed UWB Filtering	Antenna	132
5.4.1 Design and Investiga	ation of the UWB Filtering Antenna	132
5.4.2 Results and Discussi	on	137
5.4.2.1 Reflection Coef	ficient-Frequency Characteristics	137
5.4.2.2 Simulated Surfa	ace Current Distributions	137
5.4.2.3 Radiation Patter	ms	138
5.4.2.4 Peak Realized C	Gain-Frequency Characteristics	139
5.4.2.5 Simulated Total	Efficiency-Frequency Characteristic	140
5.4.2.6 Time Domain A	nalysis	143
	omparison of the Proposed UWB na with Those Reported in Literature	145
5.5 Conclusion		145
CHAPTER 6 Summary and Conclu	sion	147-154
6.1 Summary and Conclusion	1	147
6.2 Scope for Further Work		154
References		155-166
Author's Publications		167-168