

Contents

List of Figures	xiii
Symbols	xv
Preface	xvii
1 Introduction	1
1.1 Spectral Graph Theory	1
1.2 Matrix-theoretical Concepts	3
1.2.1 Perron-Frobenius Theorem	5
1.2.2 Interlacing Theorem	5
1.2.3 Equitable Quotient Matrix	6
1.3 Graph-theoretical Concepts	7
1.4 Signless Laplacian of Graph	9
1.5 Q-integral Graph	12
1.6 Outline of the Thesis	14
2 Induced Subgraphs of Q-integral Graphs	17
2.1 Connection between Q-spectral Radius and Edge-degrees	17
2.2 Q-graphs and Q-matrices	19
2.3 Q-integral Graphs with Q-spectral Radius 7	24
2.4 Bipartite Q-integral graphs with Q-spectral radius 7	44
2.5 Conclusions	60
3 Graphs with Integer-valued Q-spectral Radius	63
3.1 Structural Characterization of Subgraphs	65
3.2 Graphs with Q-spectral Radius at most 9	68
3.2.1 Q-spectral Radius 5	69
3.2.2 Q-spectral Radius 6 and 7	70

3.2.3	Q-spectral Radius 8	71
3.2.4	Q-spectral Radius 9	74
3.3	Graphs containing Double Star as a Subgraph	77
3.4	Graphs containing Variation of Double Star	82
3.5	Graphs with Maximum Edge-degree 4	88
3.6	Conclusion	94
4	Complete Bipartite Graphs with Self-loops	95
4.1	Star Graph	98
4.2	Complete Equipartite Graph	100
4.3	Conclusion	116
5	Summary and Conclusions	117
5.1	Scope for Future Work	118
	 Bibliography	 121
	 List of Publications	 127