

CONTENTS

<i>List of Figures</i>	<i>xv-xix</i>	
<i>List of Tables</i>	<i>xxi-xxii</i>	
<i>List of Abbreviations and symbols</i>	<i>xxiii xxiv</i>	
<i>Preface</i>	<i>xxv- xxvii</i>	
CHAPTER 1	Introduction and Literature Review	1-20
1.1	Introduction	1
1.2	Historical of Porcelain	4
1.3	Types of Porcelain Insulators	7
1.4	Factors Affecting Insulation Properties	9
1.5	Properties of an Ideal Insulator	11
1.6	Application of Insulators	12
1.7	Literature Review	15
1.8	Objectives of Work	19
CHAPTER 2	Experimental Techniques, Material and Equipment Requirement	21-40
2.1	Flow Chart	21
2.2	Procedure	23
2.3	Equipment Requirement	25
2.3.1	Electronic Balance	25
2.3.2	China Crucible	26
2.3.3	Hot air Oven	26
2.3.4	Hydraulic Press	27
2.3.5	Electrical Furnace	28
2.3.6	X-Ray Diffraction Analysis	29

2.3.7	Scanning Electron Microscopy (SEM)	31
2.3.8	Water Bath Machine	32
2.3.9	Universal Testing Machine	34
2.3.10	Compressive Strength	35
2.3.11	Bending Strength	36
2.3.12	Linear Thermal Expansion	37
2.3.13	AC Dielectric Strength Measurement	38
2.3.14	AC Dielectric Constant and Loss tangent measurement at Low and Microwave Frequency	39
CHAPTER 3	Synthesis and Characterization of Alumina-Silica Based Ceramic Porcelain Insulator	41-62
3.1	Introduction	41
3.2	Materials and Experimental	43
3.2.1	Material Preparation	43
3.2.2	Characterizations	45
3.3	Results and Discussion	46
3.3.1	Bending, Compressive and Tensile Strength	53
3.3.2	Thermal Expansion	55
3.3.3	AC Dielectric Constant and Dielectric Loss	56
3.3.4	Measurements of Dielectric Breakdown Voltage	60
3.4	Conclusions	61
CHAPTER 4	Electro-Mechanical Characterization of Ceramic Porcelain Insulator with Zirconia Reinforcement	63-94
4.1	Introduction	63
4.2	Experimental Material Preparation and Techniques	64

4.2.1	Characterization	67
4.3	Result and Discussion	71
4.3.1	Physical and Mechanical Properties:	78
4.3.2	Dielectric Constant and Dielectric Loss at Room Temperature with Frequency Variation (20 Hz to 1MHz)	84
4.3.3	AC Conductivity and Resistivity Measurement	85
4.3.4	AC Dielectric Constant and Dielectric Loss at Microwave Frequency	87
4.3.5	AC Dielectric Constant and Dielectric Loss at 5 And 20 GHz With Temperature Variation	90
4.3.6	AC Dielectric Strength Measurement	91
4.4	Conclusion	92
CHAPTER 5	Synthesis and Characterization of Alumina Based Porcelain Insulator using Economical Raw Materials Doped with Zirconia	95-122
5.1	Introduction	95
5.2	Experimental Details	96
5.2.1	Material and Preparation	96
5.2.2	Characterizations	98
5.2.3	X-Ray Diffraction (XRD) Analysis	98
5.2.4	Scanning Electron Microscopy (SEM) Analysis	98
5.2.5	Mechanical Tests	99
5.2.6	Electrical Tests	99
5.3	Result and Discussion	100
5.3.1	X-Ray Diffraction	100

5.3.2	Scanning Electron Microscopy	102
5.3.3	Coefficient of thermal expansion	104
5.3.4	Physical and Mechanical Behaviour	105
5.3.5	Electrical Behaviour	109
5.4	Conclusion	119
CHAPTER 6	Effect of BaTiO₃ addition on Electrical, Mechanical and Dielectric Properties of Ceramic Porcelain Insulator	123-144
6.1	Introduction	123
6.2	Material and Experimental Characterization	124
6.2.1	Physical Properties	126
6.2.2	Mechanical Characterization	126
6.2.3	Electrical Characterization	127
6.3	Result and Discussion	127
6.3.1	Morphological Analysis	127
6.3.2	Physical Analysis	131
6.3.3	Mechanical Characterization	134
6.3.4	Electrical Characterization	136
6.4	Conclusion	142
CHAPTER 7	Conclusion	145-150
7.1	Conclusion	145
7.2	Scope for Future Work	150
<i>References</i>		<i>151-158</i>
<i>Author's Relevant Publication</i>		<i>159</i>