

C O N T E N T S

Chapter No.	Title	Page No.
	<i>Declaration</i>	<i>I</i>
	<i>Certificate</i>	<i>II</i>
	<i>Acknowledgement</i>	<i>III</i>
	<i>Preface</i>	<i>IV</i>
CHAPTER I	AN INTRODUCTION TO FERRITE	
1.1	Introduction	1
1.2	Historical background	1
1.3	Structure of ferrite material	4
1.3.1	Spinel crystal structure	4
1.3.2	Classification of spinel ferrites	8
1.4	Magnetic interactions in ferrites	10
1.5	Theories of ferrimagnetism	13
1.5.1	Neel's theory	13
1.5.1.1	Paramagnetic susceptibility	14
1.5.1.2	Spontaneous magnetization	16
1.5.2	Yafet-Kittel theory	16
1.5.3	Kaplan's spiral structure	18
1.6	Properties and applications of ferrites	18
1.7	Orientation of the work	21
	<i>References</i>	
CHAPTER II	PREPARATION AND CHARACTERIZATION	
	PART - A: PREPARATION METHODS	
2.A.1	Introduction	26
2.A.2	Preparation methods	26
2.A.3	Presintering	28
2.A.4	Pressing and final sintering	30
2.A.5	Mechanism of solid state reaction	31
2.A.6	Hot pressing	32
2.A.7	Actual preparation of samples	32
2.A.7.1	Mixing and presintering	34
2.A.7.2	Sintering	35

PART - B: X-RAY DIFFRACTION STUDIES

2.B.1	Introduction	35
2.B.2	Diffraction condition	36
2.B.3	Experimental diffraction methods	36
2.B.4	Principle of diffractometer	37
2.B.5	Indexing pattern of crystals	39
2.B.6	Experimental	40
2.B.7	Results and discussion	41

PART - C: IR STUDIES

2.C.1	Introduction	54
2.C.2	Experimental	57
2.C.3	Results and discussion	57

References

CHAPTER III

MAGNETIC PROPERTIES PART - A: MAGNETIZATION

3.A.1	Introduction	66
3.A.2	Magnetic anisotropy	67
3.A.3	Magnetostriction	68
3.A.4	Hysteresis	69
3.A.5	Experimental	73
3.A.6	Calculation of M_s and n_s	74
3.A.7	Results and discussion	74

PART - B: AC SUSCEPTIBILITY AND PERMEABILITY

3.B.1	AC susceptibility	78
3.B.2	Experimental	81
3.B.3	Results and discussion	83
3.B.4	Permeability	89
3.B.5	Experimental	90
3.B.6	Results and discussion	91

PART - C: CURIE TEMPERATURE

3.C.1	Curie temperature	98
3.C.2	Results and discussion	99
3.C.3	Gilleo's model and cation distribution	101

References

**CHAPTER
IV**

ELECTRICAL PROPERTIES

PART - A: DC CONDUCTIVITY

4.A.1	Introduction	105
4.A.2	Conduction in ferrite	105
4.A.3	Experimental	109
4.A.4	Results and discussion	109

PART - B: THERMOELECTRIC POWER

4.B.1	Introduction	116
4.B.2	Experimental	118
4.B.3	Results and discussion	121

PART - C: AC ELECTRICAL CONDUCTIVITY

4.C.1	Introduction	132
4.C.2	Polarization and dielectric constant	133
4.C.3	Experimental	134
4.C.4	Results and discussion	136

References

**CHAPTER
V**

SUMMARY AND CONCLUSIONS

146

References
