

## C O N T E N T S

Chapter No.	Title	Page.No.
<b>CHAPTER - I INTRODUCTION FERRITES.</b>		1-30
1.1	Introduction	1
1.2	Historical	1
1.3	Crystal structure of ferrite material	5
1.3.1	Chemical structure of spinel ferrites	5
1.3.2	Lattice structure of spinel ferrites.	7
1.3.3	Classification of Ferrites.	8
1.3.3a.	Normal spinel ferrite	8
1.3.3b.	Inverse spinel ferrite	10
1.3.3c	Random spinel structure	10
1.3.4	Substitutional ferrites	11
1.3.5	Magnetic interactions	12
1.4	Ferrimagnetism	12
1.5	Neel's theory of ferrimagnetism	14
1.6	Yafet Kittel theory	20
1.7	Properties of ferrites	23
1.7.1	Magnetic properties	23
1.7.1a	Saturation magnetization	23
1.7.1b	Magnetostriction	24
1.7.1c	Permeability	24
1.7.1d	Hysteresis	24
1.7.2	Electrical properties	25
1.7.2a	D.C. Conductivity	26
1.7.2b	Dielectric behaviour	26
1.7.2c	Thermoelectric power	26
1.8	Applications	27
1.9	Orientation of the present work	28
	References	31
<b>CHAPTER - II PREPERATION OF FERRITES AND CHARACTERIZATION</b>		
<b>SECTION - A</b>		
<b>PREPERATION OF FERRITES</b>		
2A.1	Introduction	34
2A.2	Ceramic method of preparation	35
2A.3a	Method of preparation : Oxide method	35
2A.3b	Decomposition method	37

2A.4	Presintering	37
2A.5	Pressing	38
2A.6	Hot pressing	38
2A.7	Sintering	39
2A.8.1	Actual preparation of ferrite samples	39
2A.8.2	Presintering and grinding	40
2A.8.3	Pellet formation	41
2A.8.4	Final sintering	41

## SECTION - B

### X-RAY DIFFRACTION STUDIES

2B.1	Introduction	42
2B.2	X-ray diffraction condition	42
2B.3	X-ray diffraction method	43
2B.3.1	Laud method	44
2B.3.2	Rotating crystal method	44
2B.3.3	Powder method	44
2B.4	X-ray diffractometer	45
2B.5	Experimental	47
2B.6	Results and discussion	49

## SECTION - C

### INFRA-RED STUDIES

2C.1	Introduction	59
2C.2	Experimental	61
2C.3	Results and discussion	62
	References	69

## CHAPTER - III MAGNETIC PROPERTIES

### SECTION - A

#### MAGNETIZATION STUDIES

3A.1	Introduction	72
3A.2	Magnetization in ferrites	73
3A.3	Domain theory	75
3A.4	Hysteresis and coercivity	76
3A.5	Experimental	80
3A.6	Results and discussion	83

**SECTION - B**

**A.C. SUSCEPTIBILITY STUDIES**

3B.1	Introduction	86
3B.2	Experimental	88
3B.3	Results and discussion	92
	References	97

**CHAPTER - IV ELECTRICAL PROPERTIES**

**D.C. ELECTRICAL CONDUCTIVITY**

4.1	Introduction	100
4.2	Conduction in oxides	101
4.3	Conduction in ferrites	102
4.4	Electron hopping and polarons	103
4.5	Experimental	105
4.6	Results and discussion	118
	References	114

**CHAPTER - V SUMMARY AND CONCLUSIONS** 116-122

	References	122
--	------------	-----