

C O N T E N T S

CHAPTER NO.	TITLE	PAGE NO.
Chapter - I INTRODUCTION		
1.1	General	1
1.2	Review of the Literature	2
1.3	Statement of the problem.	4
1.4	About the dissertation	6
 Chapter - II THEORETICAL BACKGROUND		
2.1	Introduction	10
2.2	Electrical Resistivity	11
2.2.1	Resistivity Measurement	12
2.2.2	Two point probe method	13
2.2.3	Four probe method	15
2.3	Thermoelectric Power (TEP)	20
2.3.1	TEP Measurement	22
2.4	Data acquisition and conversion	23
2.4.1	Block diagram	23
2.4.2	Objectives of DAS	24
2.4.3	Signal Conditioning (DC & AC)	25
2.5	Signal Conditioning Units	27
2.5.1	Signal Conditioning Circuits	28
2.5.2	Temperature-to-Voltage Converter	29
2.5.3	Current-to-Voltage-Converter	31
2.5.4	Instrumentation Amplifier	33
2.5.5	Voltage Amplifier	36

CHAPTER NO.	TITLE	PAGE NO.
Chapter - III SYSTEM DESIGN		
3.1	Introduction	38
3.2	Mechanical System design Considerations	38
3.3	Electrical Resistivity and TEP Measurement set up	39
3.3.1	System Platform	39
3.3.2	Hot Plates	41
3.3.3	Heat ng Arrangement	41
3.3.4	Temperature Sensor	41
3.3.5	Probe Assembly	41
3.4	Basics of Electronic System	42
3.4.1.	Operating Principle	42
3.4.2.	System block diagram	43
3.4.3.	Description and Working	44
3.4.3.1	Electrical Resistivity Measurement	44
3.4.3.2	TEP Measurement	45
Chapter- IV DESIGN AND DEVELOPMENT OF ELECTRONIC SYSTEM		
4.1	Introduction	47
4.2	System Hardware	47
4.3	Designing of Electronic System	49
4.3.1	Temperature-to-Voltage Converter	50
4.3.2	Current-to-Voltage Converter	52
4.3.3	Instrumentation Amplifier	54
4.3.4	Voltage Amplifier	56
4.4	Circuit Details	56
4.4.1	Circuit Diagram	57
4.4.2	Hardware Description	56
4.5.	Development of Electronic System	59

CHAPTER NO.	TITLE	PAGE NO.
4.6.	Testing and Calibration of Electronic System	61
4.6.1	Temperature-to-Voltage Converter	61
4.6.2	Current-to-Voltage Converter	61
4.6.3	Instrumentation Amplifier	62
4.6.4	Voltage Amplifier	62

Chapter - V INTERFACING AND SOFTWARE DEVELOPMENT

5.1	Introduction	64
5.2	System Interface	64
5.3	Interface Card - PCL-207	65
5.3.1	Main Features	65
5.3.2	Hardware Details	66
5.3.3	Base Address Selection	66
5.3.4	Software Details	68
5.3.5	A/D Conversion using PCL-207	70
5.4	System Software	72
5.4.1	Software Development Steps	72
5.5	Program Development	73
5.5.1	Main Program	74
5.5.2	Measurement Module	75
5.5.2.1	Resistivity Measurement	76
5.5.2.2	TEP Measurement	78
5.5.3	Computational Module	79
5.5.4	Display Module	83
5.6	Calibration of the System	84
5.6.1	Temperature Calibration	84
5.6.2	Voltage Calibration	86

CHAPTER NO.	TITLE	PAGE NO.
	5.6.3 Thermoemf Calibration	88
	5.6.4 Current Calibration	88
	5.6.5 Temperature gradient calibration	90
5.7	Program Listing	92
Chapter - VI RESULTS AND DISCUSSION		
6.1	Introduction	108
6.2	System Performance	108
6.2.1	Resistivity Measurement - Two Probe Method	109
6.2.2	Resistivity Measurement - Four Probe Method	109
6.2.3	TEP Measurement	112
Chapter- VII SUMMARY AND CONCLUSION		116