

# TABLE of CONTENTS

<b>NUMBER</b>	<b>CONTENTS</b>	<b>PAGE</b>
	الاية	i
	Dedication	ii
	Acknowledgement	iii
	Abstract	iv
	المستخلص	V
	Table of Contents	Vi
	List of Figures	X
	List of Tables	Xii
	List of Abbreviations	xiii
<b>CHAPTER ONE – INTRODUCTION</b>		
1.1	Background	1
1.2	Problem Statement	2
1.3	Objectives	2
1.4	Methodology	3
1.5	Thesis Lay-out	3
<b>CHAPTER TWO – CONTROL SYSTEM</b>		
2.1	Overview	4
2.2	Conventional Control System Design	4
2.2.1	Performance Objectives and Design Constraints	5
2.2.2	Controller design	5
2.3	PID Controllers	6
2.3.1	Importance of PID controller	8
2.3.2	Three-term control	9

2.3.3	Parallel PID controllers	15
2.3.4	Series PID controllers	16
2.3.5	Tuning PID controller	17
2.3.6	Choosing the structure of a PID controller	20
2.4	Fuzzy Controller	20
2.4.1	Fuzzy controller design	24
2.4.2	Fuzzy set	25
2.4.3	Linguistic variables	31
2.4.4	Fuzzy rules	32
2.4.5	Fuzzy implication	35
2.4.6	Defuzzification	38
2.4.7	Fuzzy controller structure	40
2.4.8	Fuzzy supervisory control	42
2.4.9	Supervision of conventional controllers	44
2.5	Fuzzy Tuning of PID Controllers	44
2.6	Cold Store	47
2.6.1	Design and operation of components	49
2.6.2	The refrigeration cycle	51
2.6.3	Constructional features of the cold storage	52
<b>CHAPTER THREE – SIMULATION OF COLD STORE</b>		
3.1	Fuzzy Auto-Tuning PID Control Algorithm	54
3.2	The Implementation Of Fuzzy Auto-Tuning PID Control	57
3.3	Temperature Control Method of the Cooling System	59
3.4	Simulation Method	59

<b>CHAPTER FOUR – SIMULATION RESULTS</b>		
4.1	Results and Discussions	62
<b>CHAPTER FIVE – CONCLUSION AND RECOMMENDATIONS</b>		
5.1	Conclusion	68
5.2	Recommendations	69