

## TABLE OF CONTENTS

COVER	i
APPROVAL SHEET	ii
STATEMENT SHEET	iii
TASK NUMBER SHEET	iv
DEDICATION	v
PREFACE	vi
ACKNOWLEDGEMENTS	vii
ABSTRACT	ix
TABLE OF CONTENTS	x
LIST OF FIGURES	xiii
LIST OF TABLES	xvi
NOMENCLATURE	xix
CHAPTER I INTRODUCTION	1
1.1. Background	1
1.2. Problem Formulation	3
1.3. Problem Limitation	3
1.4. Research Objectives	3
1.5. Research Benefits	4
CHAPTER II LITERATURE REVIEW	5
CHAPTER III THEORETICAL BACKGROUND	11
3.1. Thermal Comfort	11
3.2. Subjective Thermal Responses	13
3.3. Wet Bulb Globe Temperature (WBGT)	14
3.4. Operative Temperature ( $t_o$ )	15

3.5. Comfort Models	16
3.5.1. Heat balance model	16
3.5.2. Adaptive models	18
3.6. Survey Sampling	19
3.6.1. Transverse survey	19
3.6.2. Longitudinal survey	19
3.7. Hierarchy of Controls	20
CHAPTER IV RESEARCH METHODS	22
4.1. Research Implementation	22
4.1.1. Location	22
4.1.2. Research subject	22
4.1.3. Research period	22
4.2. Research Equipment	23
4.3. Research Procedure	27
4.3.1. Research design	27
4.3.2. Preliminary study	28
4.3.5. Data analysis	34
CHAPTER V RESULTS AND DISCUSSION	39
5.1. The Characteristics of Subjects	39
5.2. Indoor Climate Environment's Characteristics	41
5.3. Comparison of Thermal Sensation Votes (TSV) and Predicted Mean Vote (PMV)	42
5.4. Data Analysis	43
5.4.1. Cross tabulation analysis	43
5.4.2. Correlation test	53
5.4.3. Cross tabulation analysis Based on Conditions (Normal, 25, and 27)	54
5.4.4. The significant test	60
5.4.5. Predicting comfort temperatures	63

5.5. Behavioral Adaptations	64
5.6. Discussions	65
5.6.1. Indoor climatic environmental and subjective thermal responses	65
5.6.2. Behavioral adaptations	72
5.6.3. Key findings	73
5.7. Recommendations	78
CHAPTER VI CONCLUSION AND FUTURE WORK	81
6.1. CONCLUSION	81
6.2. FUTURE WORK	82
REFERENCES	83
INDEX	87