

TABLE OF CONTENTS

TITLE PAGE	i
APPROVAL PAGE	ii
PRONOUNCEMENT	iii
PREFACE	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
LIST OF FIGURES	ix
LIST OF TABLES	xi
LIST OF ABBREVIATIONS AND ACRONYMS	xii
NOMENCLATURE	xiii
ABSTRACT	xv
<i>INTISARI</i>	xvi
CHAPTER I INTRODUCTION	1
1.1 Background	1
1.2 Problem Formulation	5
1.3 Limitation of Research	5
1.4 Objective of Research	5
1.5 Benefits of Research	6
CHAPTER II LITERATURE REVIEW	7
CHAPTER III BASIC THEORY	11
3.1 Composite Material	11
3.2 Fiber Reinforced Polymer Composite	12
3.3 Constituents Fiber	13
3.1.1 Natural Fibers	14
3.1.2 Salak Fiber	15
3.4 Matrix	16
3.4.1 Epoxy Resin	16
3.4.2 Epoxy Hardener	16

3.4.3	Calcium Carbonate (CaCO_3)	17
3.5	Manufacturing Processes for Thermoset Composites	17
3.6	Longitudinal Modulus	18
3.7	Hybrid Composite	20
3.8	Calcium Carbonate/epoxy Matrix Mixing Ratio	21
3.9	Physical and Mechanical Properties	22
3.10	Introduction of Test Apparatus	23
3.10.1	Tensile Test	23
3.10.2	Density Test	26
3.10.3	Scanning Electron Microscopy (SEM)	26
CHAPTER IV	RESEARCH METHODOLOGY	27
4.1	Materials Research	27
4.1.1	Epoxy Resin - Eposchon A	27
4.1.2	Epoxy Hardener - Eposchon B	27
4.1.3	Micro-Calcium Carbonate Particle	27
4.1.4	Salak Fiber	28
4.1.5	Sodium Hydroxide (NaOH)	29
4.2	Volume/Weight Fraction of Fiber and Matrix Content Composite	29
4.2.1	Fiber Volume and Weight Ratio Relationship	29
4.3	Processing of Fibre Reinforced Composites	30
4.3.1	Preparation of Epoxy and Hardener Composites	30
4.3.2	Preparation of micro- CaCO_3 particle and Epoxy Matrix Composites	31
4.3.3	Preparation of Salak Fiber Composites	31
4.3.4	Preparation of Salak Fiber Reinforced Matrix Composites	33
4.3.5	Alkali Treatment of Salak Fiber	32
4.3.6	Degassing Resin in Vacuum Chamber	33
4.3.7	Hand Lay-up	33
4.3.8	Mould	34

4.4	Experimental Procedure and Setups	37
4.4.1	Specimen Procedure Sampling	37
4.4.2	Dimension of Test Pieces	37
4.4.3	Specimen Test Procedure	38
4.5	Introduction of Mechanical Initial Testing Process	38
4.5.1	Tensile Test (<i>ASTM D638-14</i>)	39
4.5.2	Density Test	40
4.5.3	Scanning Electron Microscope (SEM)	42
4.5.4	The Experimental Flow Chart	43
CHAPTER V	RESULTS AND DISCUSSION	44
5.1	Experimental Results	44
5.1.1	Volume Fraction	44
5.1.2	Bulk Density Composite	45
5.1.3	Void Content	46
5.2	Tensile Properties of Composites	47
5.3	Scanning Electron Microscopy (SEM) Analysis	52
5.4	Specific Strength	56
CHAPTER VI	CONCLUSION	59
6.1	Conclusion	59
6.2	Suggestions for Future Work	60
	REFERENCES	62
	APPENDIX	67