# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>i</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF SYMBOLS AND ABBREVIATIONS</td>
<td>xv</td>
</tr>
</tbody>
</table>

## Chapter 1 INTRODUCTION

1.1 OVERVIEW                                           | 2        |
1.2 WHY A COMPOSITE                                     | 2        |
1.3 WHAT IS A COMPOSITE                                 | 3        |
1.4 CLASSIFICATION OF COMPOSITES                         | 4        |
1.5 NECESSITY OF INCORPORATING RED MUD FILLER IN COMPOSITE | 6        |
1.6 THESIS OUTLINE                                      | 7        |

## Chapter 2 LITERATURE SURVEY

2.1 INTRODUCTION                                         | 11       |
2.2 ON NATURAL FIBER POLYMER COMPOSITES                  | 11       |
2.3 ON MECHANICAL CHARACTERIZATION OF COMPOSITES         | 20       |
2.4 ON BUCKLING ANALYSIS OF COMPOSITES                   | 26       |
2.5 ON VIBRATION ANALYSIS OF COMPOSITES                   | 29       |
2.6 ON USES OF RED MUD COMPOSITE                         | 32       |
2.7 CRITICAL REVIEW OF LITERATURE                        | 36       |
2.8 OBJECTIVES AND SCOPE OF PRESENT STUDY                 | 38       |
Chapter 3 MATERIALS AND METHODS

3.1 RAW MATERIALS
   3.1.1 Fiber
   3.1.2 Matrix material
   3.1.3 Particulate Filler
   3.1.4 Hardener and accelerator

3.2 MATERIAL PREPARATION

3.3 SAMPLE PREPARATION

Chapter 4 EXPERIMENTAL PROCEDURES AND ANALYSIS

4.1 OVERVIEW

4.2 MECHANICAL CHARACTERISATION
   4.2.1 Density
   4.2.2 Tensile Strength
   4.2.3 Flexural Strength
   4.2.4 Compressive Strength
   4.2.5 Micro-hardness

4.3 BUCKLING ANALYSIS
   4.3.1 Governing Equation for Buckling
   4.3.2 Finite Element Analysis
   4.3.3 Experimental Buckling Analysis

4.4 VIBRATION ANALYSIS
   4.4.1 Free Vibrations
   4.4.2 Finite Element Analysis
   4.4.3 Experimental Vibration Analysis

Chapter 5 RESULTS AND DISCUSSIONS

5.1 INTRODUCTION

5.2 TENSILE PROPERTIES

5.3 FLEXURAL PROPERTIES
Chapter 6  PARAMETRIC ANALYSIS

6.1  OVERVIEW 106
6.2  PARAMETRIC VIBRATION ANALYSIS 106
   6.2.1  Effect of varying the density of composite plates 106
   6.2.2  Effect of varying the thickness of composite plates 108
   6.2.3  Effect of varying the tensile modulus of composite plates 109
   6.2.4  Effect of varying aspect ratio of composite plates 111
   6.2.5  Effect of various boundary conditions of composite plates 112
6.3  PARAMETRIC BUCKLING ANALYSIS 114
   6.3.1  Effect of varying the thickness of composite plates 114
   6.3.2  Effect of varying tensile modulus of composite plates 116
   6.3.3  Effect of varying aspect ratio of composite plates 117
6.4  SUMMARY 119

Chapter 7  CONCLUSIONS AND SCOPE OF FUTURE WORK

7.1  CONCLUSIONS 121
7.2  SCOPE OF FUTURE WORK 124

APPENDICES
A  MATLAB PROGRAM FOR CANTILEVER PLATE VIBRATION ANALYSIS 126
B  MATLAB PROGRAM FOR FFT 135