CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In general, research methodology was the outlines the way in which research was to be undertaken and identifies the methods to be used in it. It also can be defined as a systematic way that used to collect relevant information and data for research projects. The collection information and data can be done through analysis and interpretation of other related experimental or research.

In this chapter, the method and detailed procedures to conduct each test was documented. All of the testing was done according to standard requirement. The general works from this study were preparation of materials, water curing, sample testing and data analysis. After preparation the materials which fulfill the standard, then proceed with concrete casting. All harden concrete samples were water cured for 7, 14 and 28 days. The sample started to test when it reaches the curing age. The data collected from the test was presented in graphs and evaluated. Figure 3.1 shows the flow chart of the overall process of this research.
Figure 3.1: Flow Chart
3.2 MATERIALS

3.2.1 Cement

The cement used in this research was Ordinary Portland Cement named as Orang Kuat, certified to MS 522-1: 2007 (EN 197-1: 2000), CEM I 42.5N/52.5N and MS 522: Part 1: 2003. Orang Kuat was produced under stringent quality assurance, environmental management and health and safety systems. It was certified to MS ISO 9001, MS ISO 14001 & OHSAS 18001.

Orang Kuat was environmental friendly as it reduces the emission of carbon dioxide by using high quality limestone to take over a portion of the clinker. Besides that, during the production process, many efforts have been considered to reduce the environmental pollution.

Orang Kuat was suitable for all general purpose applications such as brickmaking, bricklaying, concreting, plastering, screeding and tiling; hence it was used in the construction project at Malaysia. The cement was packed in 50kg paper bag to make sure good quality control and stored at laboratory under air dry condition. The packing of the Orang Kuat, Ordinary Portland Cement was shows at Figure 3.2, while the properties of Orang Kuat, Ordinary Portland Cement was shows at Table 3.1.

![Figure 3.2: Orang Kuat, Ordinary Portland Cement](image)