CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The experimental procedures, material use, preparation of materials, tests and equipment, regarding this study will be discussed further in this chapter. The methodology of this study has been summarized in the flow chart in Figure 3.1.

Figure 3.1: Research of Methodology
3.2 PREPARATION OF MATERIALS

3.2.1 ORDINARY PORTLAND CEMENT

Cement is widely used in our country and it is used to hold concrete together. Ordinary Portland Cement (OPC) was manufactured in four types of processes that is, quarrying process, raw material preparation, clinkering and also cement milling. In quarrying process, limestone and cement rock are used. These materials contain Lime (CaCO3), Silica (SiO2), Alumina (Al2O3) and Ferrous Oxide (Fe2O3). In clinkering process, the raw materials were heated in kiln at very high temperature to produce Tricalcium Silicate (3CaOSiO2), Dicalcium Silicate (2CaOSiO2), Tricalcium Aluminate (3CaOAL2O3), and also TetracalciumAlumino-Ferrate (4CaOAL2O3Fe2O2). In cement milling process, the clinker will be crushed to a fine powder to form cement.

For this study, OPC with brand name Orang Kuat certified to MS ISO 9001, MS ISO 14001 & OHSAS 18001 as shown in Figure 3.2 was used. OPC was chosen because this cement is specially formulated for high early age strength. It is ideal for high strength concrete applications where time is of the essence. Orang Kuat is suitable for concrete structure, precast, brickmaking and all general applications, where high strength is needed to improve productivity. Not only that, it was produced using the most advanced energy efficient cement production process. Every effort has been made to reduce the environmental footprint during the production of this product which is the reduction of using Carbon Dioxide (CO2).

Figure 3.2: Orang Kuat Ordinary Portland Cement
Orang Kuat OPC is produced using the most advanced energy efficient cement production process. It is made to reduce the environmental foot print during the production of this product. Not only that, this cement is good for brickmaking, bricklaying, plastering and also concreting.

3.2.2 WATER

The water–cement ratio is the ratio of the weight of water to the weight of cement used in a concrete mix and has an important influence on the quality of concrete produced. A lower water-cement ratio leads to higher strength and durability, but may make the mix more difficult to place. For this study, the water – cement ratio is 0.55.

3.2.3 FINE AGGREGATE

Fine aggregate is made up of crushed stone or sand that is used in concrete mixed. In this study, natural sand was used as fine aggregate. The fine aggregate which was used in this study was obtained using sieve method with 5mm percent passing. For this study, the fine aggregate that was used is river sand as shown in Figure 3.3. River sand is most preferred choice for the fine aggregate. River sand is a product of natural weathering of rocks over period of time.

Figure 3.3: River sand