CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Nowadays, the construction industry use concrete as the main construction material. There are few types of concrete such as high strength concrete, dense concrete, lightweight concrete and others. The use of high strength concrete is also being more utilized in the construction industry due its high durability and strength compared to those of normal strength thus offering many more application in the future. High strength concrete can be used to produce lighter, longer precast members and small size columns. Commonly in buildings, high strength concrete is used in beams but it also can be used as a vertical members and it will reduce their cross section. High density or heavyweight concrete is concrete with a density greater than 2600kg/m³. It’s primary use is in radiation shielding, either in nuclear power plants or in radiation therapy units. It can also be used as ballast in offshore locations such as pipelines. While lightweight concrete is type of concrete which includes an expanding agent in that it increases the volume of the mixture while giving additional qualities such as nailibility and lessened the dead weight. It is lighter than the conventional concrete. The main specialties of lightweight concrete are its low density and thermal conductivity. The advantages are reduction of dead load, and lower haulage and handling costs.

High strength concrete is made possible by reducing porosity, inhomogeneity and microcracks which can be achieved by using supplementary coarse aggregates such as palm kernel shell and coconut shell.
Malaysia is a country that produces oil palm and the largest producer and exporter of oil palm in world. Oil palm industry in Malaysia has produce 17.60 million tons of oil palm in 2009 comparing to the production in 2008 is 17.56 million tones. From the mills, roughly over 4 million tons of palm kernel shell solid waste was produced annually. Thus the large amount of waste produced has caused the nation’s pollution problem occurs (Teo et al, 2006). One of the ways to minimize the pollution, these wastes would be utilization of some of these into constructive building materials. Palm Kernel Shell (PKS) are light weight and having a similar sized, so it is suitable to be replacement as an aggregates in concrete. These waste materials that do not produce toxic when they are mixed with wet concrete. Therefore PKS able to prevent the damage of natural resources and also able to control or maintain the ecological balance. According to Basri.H.B, Mannan.M.A. & Zain .M.F.M, (1998), replacement aggregates with PKS can produce lightweight concrete with a moderate strength and it is able to applicant in flooring and walls. There are some product of PKS concrete that had been studied, for instances University Malaysia Sabah (UMS) has constructed a 2 meter span footbridge in the years 2001 and an effective cost house with the area of about 59m² in the years 2003 (Teo et al, 2006 ). Therefore, the demand of the PKS concrete in construction development will be increasing and able to become an alternative approaches in construction.

Thus, the studies of performances may be carried out to show that PKS concrete is applicable and able to have the same or similarly properties with normal concrete nowadays. Since the PKS considered lightweight, cost-effective and environmental friendly, it can be the alternative way to produce a lightweight concrete.

1.1 PROBLEM STATEMENT

The high demand for conventional construction materials such as concrete, bricks, hollow blocks, solid blocks, pavement blocks and tiles in construction industry has led towards a rapid decrease in natural sources such as gravel, granite and river sand, thus causing ecological imbalance. In the case of granite, the extensive use of concrete has lead high consumption of this course aggregates. Continuous usage of this
nonrenewable resource would cause the depletion of this natural aggregate for the use of future generation.

At the same time, oil palm industries in Malaysia have continued to increase due to the high demands of human needs such as vegetable oil. Oil palm shell is one of byproducts produce at oil palm mills. In Malaysia, over 4 million tons of oil palm shell has been generated annually. This shell has been dump and stockpiled at landfill, thus causes storage problem in the vicinity of the factories since large quantities of these wastes are produced every day. Hence, these wastes are harmful to the ecosystem. In addition, with the global economic recession coupled with the market inflationary trends, the constituent materials used for these structures had led to a very high cost of construction. Using PKS waste in the production concrete material would reduce only reduced the environmental problem.

1.2 OBJECTIVES OF STUDY

I. To determine the strength of flexural strength when added with 3 different range size of PKS (2.36mm-5mm, 5mm-10mm and 10mm-15mm).

II. To determine the compressive strength of concrete when added with 3 different range size of PKS (2.36mm-5mm, 5mm-10mm and 10mm-15mm).

III. To determine the workability of concrete when added with 3 different range size of PKS (2.36m-5mm, 5mm-10mm and 10mm-15mm).

1.3 SCOPE OF STUDY

This study was conducted to determine the strength of concrete added with palm kernel shell. In addition, palm kernel shell has an excellent potential to improve the performance of concrete. The scope of work mainly focuses on:

i. In this study, grade concrete 15 MPa with 0.55 w/c ratio. The mixture contains fine aggregates, coarse aggregates, cement and water.