POLITEKNIK MALAYSIA
SULTAN SALAHUDDIN ABDUL AZIZ SHAH

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

CIVIL ENGINEERING DEPARTMENT

CIVIL ENGINEERING PROGRAMME

"THE USAGE OF COCONUT SHELLS CHARCOAL AS AGGREGATES IN PRODUCTION TILES"

DCC6023: CIVIL ENGINEERING PROJECT 2

TITLE: FINAL YEAR PROJECT (GREEN PANEL WALL)

SESSION: 1 2022/2023

GROUP MEMBERS:

MUHAMMAD HAFIZ BIN ZULKIFLI (08DKA20F1080)

ZUNNURAIN BIN ZULKIFLI (08DKA20F1083)

LECTURER'S NAME:

1. **PUAN NORMASITA BINTI SULAIMAN**

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : USAGE OF COCONUT SHELLS CHARCOAL AS AGGREGATES IN PRODUCTION TILES

SESI : 1 2022/2023

1. Kami, **1. MUHAMMAD HAFIZ BIN ZULKIFLI (08DKA20F1080)**

   2. ZUNNURAIN BIN ZULKIFLI (08DKA17F1083)

   adalah pelajar tahun akhir, JABATAN KEJURUTERAAN AWAM, **Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150 Shah Alam, Selangor.**

2. Kami mengakui bahawa „Projek tersebut diatas" dan harta intelek yang ada di dalamnya adalah hasil karya/ rekacipta asli kami tanpa mengambil atau meniru mana- mana harta intelek daripada pihak-pihak lain.

3. Kami bersetuju melepaskan pemilikan harta intelek „Projek tersebut" kepada „Politeknik tersebut" bagi memenuhi keperluan untuk penganugerahan **Diploma Kejuruteraan Awam** kepada kami.

Diperbuat dan dengan sebenar-benarnya diakui oleh yang tersebut;)

a) MUHAMMAD HAFIZ BIN ZULKIFLI)
……
(No. Kad Pengenalan:- 010203-10-1485),) MUHAMMAD HAFIZ BIN ZULKIFLI

b) ZUNNURAIN BIN ZULKIFLI)
(No. Kad Pengenalan:- 990318-14-5089) ZUNNURAIN BIN ZULKIFLI

Di POLITEKNIK SHAH ALAM, pada
(25/10/2022)

Di hadapan saya, NORMASITA BINTI SULAIMAN)
(740429-10-5168) sebagai penyelia projek pada)
tarikh: 25/10/2022)

……

NORMASITA BINTI SULAIMAN

APPRECIATION

Bismillahirahamnirahim. Allhamdulillah is grateful to Allah SWT for His generous grace and permission to complete this project to fulfill some of the requirements of Diploma in Civil Engineering at the Polytechnic of Sultan Salahuddin Abdul Aziz Shah in Shah Alam, Selangor. Our deepest gratitude and appreciation to Puan NorMasitah Binti Sulaiman, who has provided us with so much direction and counsel that has enabled us to effectively accomplish our task. We also want to extend our profound gratitude to our parents, who have given us all the resources and moral support we need to finish this assignment and do it successfully. This greeting is also sent to close friends, particularly to the group members who have offered a lot of advice and caution over any errors committed during this task. They always respond to our questions. Finally, I'd like to express my gratitude to everyone who contributed in some way to making this project a success. May Allah SWT bestow better.

ABSTRACT

An inquiry into the use of coconut shell charcoal as a possible cement replacement and as a way to absorb water in floor tiles. It's because the issue in these studies is the excessive use of cement in walls and the desire to use coconut shells as charcoal in civil engineering. Four different ratios of coconut shell charcoal will be employed in this experiment. Portland cement, sand, and charcoal made from coconut shells were the main ingredients used. The floor tiles with coconut shell charcoal must undergo strength and water absorption tests as part of the investigation's solution. The floor tiles with 3% coconut shell charcoal had a compressive strength that was higher than the control specimen after 14 days of testing, coming in at 14.7 MN/m2. The water absorbency test will take into account the moisture content. The strength and durability of floor tiles are stronger when a tile's water absorption is reduced.

CONTENT

CHAPTER 1 – INTRODUCTION

1.1 PRELIMINARY

Specifically, our studies for a Diploma in Civil Engineering prompted us to consider the use of waste materials, specifically coconut shell charcoal, as our main component in concrete mix construction. The use of coconut shell charcoal as an aggregate in the production of tiles is what prompted us to see the benefits of using it as an additive in concrete for our final year project which is floor tiles. We named this project "The Use of Coconut Shell Charcoal as an Aggregate in Tile Production." Construction activities have been important to the growth of civilizations throughout history. Road construction has been influenced by construction activities since the beginning of human civilization.

A Thin plates or other components called tiles are used in building construction to cover surfaces including roofs, floors, and walls. Applications for various tile types are discussed. In the current situation, tiles are a key component in adding finishing and beauty to both the interior and exterior of buildings. They primarily consist of clay or other inorganic basic materials. These days, recycled materials are also used to make tiles, making the material more environmentally friendly. The diverse procedures, such as extrusion or pressing at room temperature or any other manner, are used to shape the tiles. They are let to dry after shaping. Fire is used to dry out these materials. It is important to make sure they acquire the necessary qualities during this firing step so they may be used in the market and for building applications. There are various tile kinds that can be purchased in glazed or unglazed form for use in building construction. They are inherently incombustible. The light has no effect on the tiles.

Use of Tiles are frequently utilised as dining room tabletops as well as flooring in kitchens, baths, parking lots, and rooftops. Materials like ceramic, porcelain, glass, stone, or metal are used to make tiles. Since tiles come in a variety of sizes, shapes, colours, and textures, we may use them to decorate in any manner.

1.2 BACKGROUND RESEARCH

One of the biggest producers and exporters of palm oil is Malaysia. With the oil palm sector in full swing, a lot of biomass waste is being produced by palm oil mills. Empty fruit bunches (EFB), palm oil fruits (POF), palm kernel shells (PKS), and palm oil mill effluent are the principal wastes (POME). Take fresh fruit bunches as an example. During the manufacture of palm oil, over 70% of them are converted into biomass wastes such as EFBs, fibres, and shells as well as liquid effluent.

In general, palm oil wastes consist of decanter cake, seed shells, empty fruit bunches, palm oil mill effluent, palm oil mill sludge, oil palm fronds, oil palm trunks, and palm pressed fibres (PPF). There are 6 tonnes of old leaves, 1 tonne of trunk, 5 tonnes of empty fruit bunches, 1 tonne of peel fibre, 0.5 tonnes of palm kernel shell, 0.25 tonnes of pomace, and 3 tonnes of palm oil mill effluent when one tonne of palm oil is extracted. In the process of producing palm oil, trash make up a significant amount. In the nations where palm oil is produced, waste management is a serious problem.

According to studies, it is conceivable to substitute recycled materials for some of the typical mixing components in concrete products to create a more environmentally friendly building material. Used eggsh are one typical material that can be recycled and possibly used in concrete applications. If properly scrutinised, coconut shell charcoal waste, which is made from materials used in food preparation, falls within the category of food waste and is a good replacement for traditional building materials.

1.3 PROBLEM STATEMENT

1. The problem of our product is material of tiles mixture tend to be quite heavy than basic tiles.

A lightweight floor may not be able to support the weight of tile flooring, which is very heavy. Make sure the floor is sturdy enough to support the additional weight of the tiles before you begin putting them.

2. Reuse,reduce and recycle waste product of coconut shells as aggregate replacement in tiles mixture.

Due to lack of understanding and the poor quality of the coconut shells, many people nowadays do not benefit from them. Coconut shells also share some of cement's physical characteristics. Coconut shells contain barium carbonate, which has limestone-like characteristics. Coconut shells cannot be added as an ingredient to the cement mixture if limestone can be used as a substitute for cement. Because the physical properties of coconut shells can be compared to those of calcium silicate brick, which gave the construction its strength, ensure that the floor tiles have a sturdy structure. Because coconut shells are waste materials that can be recycled, using them in construction allows us to create buildings that are environmentally friendly. There haven't been many studies on using leftover coconut shells in civil engineering. The potential of coconut shell-stabilized soil as a subgrade material for road building was then explored using coconut shell powder as a stabilising ingredient to improve soil qualities. More than these experiments, there haven't been any other inquiries on using coconut shells in civil engineering.

3. Usage of material can be quite expensive, often exceed standard option prices and increase with the cost of installation.

Typically, floor tiles cost a lot of money. The price typically ranges between RM2,500 and RM3,500 when the cost of the tiles and the cost of installation are added together. The cost may vary depending on the size and brand of tiles you choose. Additionally, they normally cost between RM1.80 for a tiny tile and RM632.40 for a lot (huge-sized tile) For instance, a heavy-duty tile of the same size can cost up to RM2.70 per piece whereas a porcelain tile of the same size costs RM1.80 per piece.

However, because we use natural materials as our primary raw materials and because our products are ideal for use in automobile porches and have lighter floor tiles than those of our competitors, our products are more reasonably priced.

1.4 OBJECTIVE PROJECT

Based on problem of panel wall that we study, there are some objectives that we would to achieve. Objective for this study is:

i. To produce a light tiles with combination green material as Coconut shells. Shells.
ii. To determine the strength, and weight of coconut shells charcoal.

1.5 RESEARCH QUESTION

i. How to prove that floor tiles containing additives such as coconut shells charcoal can absorb water?
ii. Can coconut shells charcoal be an additive in cement concrete?

1.6 SCOPE OF THE RESEARCH

The strength test and the water absorbency test must both be done on the floor tiles. Different percentages of charcoal from coconut shells are used in each floor tile. 3% of the coconut shell charcoal will be used by the first floor tiles, 5% by the second floor tiles, 10% by the third floor tiles, and the remaining 3% by the fourth floor tiles. Each floor tile is one foot by one foot in size. To test whether or not the floor tiles will absorb water, they will be manufactured with varying percentages of coconut shell charcoal and the same thickness. The strength of the floor tiles will next be evaluated while the percentage of various coconut shells is measured using charcoal. For each percent of coconut shell charcoal, we will give three sample floor tiles in the same thickness.

1.7 IMPORTANT OF RESEARCH

To reduce the cement in the mixture, this is because cement is a mixture of materials that can pollute the air:

1) Coconut shells charcoal are also substitutes for cement, besides use cement, we can use coconut shells charcoal as a result of research.
2) To ensure that every step done is not repeated and does not repeat the researcher's failure before.
3) To make sure every work done is always improved and less mistakes when doing work.

1.8 TERM/ OPERATION DEFINITION

Tiles, which can be anything from straightforward square tiles to intricate mosaics, are frequently used to create wall and floor coverings. The most popular material for tiles is ceramic, which is normally glazed for interior usage and unglazed for roofing. However, other materials like glass, cork, concrete and other composite materials, stone, and are also frequently used. Typically, marble, onyx, granite, or slate are used as tiling stones. For flooring, which require more robust surfaces that can withstand impacts, thinner tiles can be employed. The use of coconut shell charcoal as aggregates in the production of tiles, as the case may be, has inspired us to develop new floor tiles that are stronger and better at absorbing water.

Flooring tiles are described as Tiles are often thin, rectangular or square coverings made of durable materials like ceramic, stone, metal, baked clay, or even glass. In order to cover edges, roofs, floors, walls, and other items like tabletops, they are typically set in place in an array. When used to walls and ceilings, tile can also refer to a variety of similar lightweight constructions that are similar to it, including perlite, wood, and mineral wool. In another definition, a tile is a building tile or a comparable object, such the rectangular game counters (see tile-based game).The word is derived from the Latin word tegula, which means a roof tile made of heated clay. It comes from the French word tuile.

Researchers are always experimenting with new cement-based compounds around the globe to enhance the qualities of concrete. One of these materials is coconut shell charcoal (CSC). In the samples of concrete and mortar, coconut shell charcoal is added in amounts of 10%, 15%, 20%, and 30% of the cement's weight. Experimental tests were performed on the coconut shell charcoal concrete to examine its strength properties, including abrasion, compressive strength, and drop weight impact tests. NaCl, $MgSO_4$, a sea water test, and a wet and dry cycle test were also carried out to evaluate the concrete's durability. According to the results of the experimental study, strength did not rise with the addition of CSC but rather decreased with the addition of coconut shell charcoal only after 10% addition of CSC. However, durability and abrasion resistance were somewhat enhanced. Additionally, an examination of the ultrasonic pulse velocity revealed that the material was of a homogeneous nature.

1.9 CHAPTER SUMMARY

We briefly describe the project we will be working on in this chapter. Additionally, we communicate the problem description for the current product, and we made a few minor improvements to our project. We are also discussing the history of the project we intend to undertake. We also discussed the problems that arose during the process. We also came to a conclusion regarding how we came up with the project idea and the significance of the work we are about to undertake in this chapter.

CHAPTER 2 – LITERATURE STUDY

2.1 INRODUCTION

These days, there are many different types of floor tiles, and the best ones have several designs that entice customers to acquire them. Additionally, it is now simpler to manufacture floor tiles. The concepts and theories that we used for our research will be discussed in this chapter. Additionally, we provide online historical study regarding floor tiles and coconut shell charcoal.

2.2 CONCEPT/THEORY

1. Theory from Nurul Nadia Ahmad and Umar Kassim

On the topic of sustainable organic materials flooring tile made from coconut shells, Nurul Nadia Ahmad and Umar Kassim hold a BE student (civil) degree from the Department of Civil Engineering Technology, Faculty of Engineering Technology, Universiti Malaysia Perlis (UnMAP), Sg. Chuchuh, 02100 Padang Besar, Perlis, Malaysia. In Malaysia, there are just too many 24-hour traders who provide drinks, santan, and other foods with coconuts, and who, of course, just toss the coconut shells into the barrel. Naturally, if we collect, we must discard a lot of coconut shells, just like the rest of the world.

Furthermore, according to research by the Chinese company Ningxia Baiyun Carbon, "Coconut shell activated carbon is created from fine coconut shell through a number of production procedures. Coconut shell activated carbon has a grainy, black look. It has benefits like highly developed pores, effective adsorption, high strength, simple regeneration, long-lasting affordability, etc. However, the cost is more than that of traditional wooden activated carbon because of things like the origin of coconut shell. The principal applications of the goods are the desulfurization and purification of gold in the refining industry, as well as the purification, decolorization, dechlorination, and deodorization of drinking water, purified water, winemaking, beverages, and industrial sewage.

2. Theory from Prof. Dr. Muhammad Fauzi Mohd Zain

The manufacturing of Portland cement, which is widely utilised in the country's construction industry, not only contributes to world carbon dioxide emissions by 7%, but it also consumes a significant amount of natural resources, including limestone, clay, oil, coal, and other materials.

2.3 PAST RESEARCH

"Sustainable Organic Materials Flooring Tile from Coconut Shell as Aggregate by Nurul Nadia Ahmad and Umar Kassim"

Concrete pavement is swapped out for organic flooring tiles made from coconut shells. The interior of the coconut is designed to be protected by the coconut shell, which is the toughest portion of the coconut fruit. Additionally, charcoal is made from coconut shell, which is far superior to other materials. Due to the strength of the coconut shell, it is also ideal for extended periods of time when used to make crafts. The issue of the high level of trash from coconut shells and the potential for pollution are issues and difficulties that require further study.

The effects of using organic resources in building are also high market prices for coarse aggregate. For the goal of figuring out the percentage composition of the content suitable for making concrete "pavement" products, several samples have been created. Then the drying of the coconut shell in the sun as part of the preservation procedure was done.

In this example, aggregate, quarry dust, ordinary Portland cement (SPB), and coconut shell are used. In this study, the percentage of coconut shell relative to the aggregate for spare parts was (3%), (5%), and (10%). Water absorption and bending strength tests are performed in the lab. Results range from 1% to 2.66% for average water absorption and from 3.5% to 3.97% for average flexural strength. The concrete pavement is 300mmx300mmx25mm in dimension. According to laboratory experiments, a high coconut shell content will result in excessive water absorption and decreased flexural strength.

2.4 CHAPTER SUMMARY

This chapter has shown that the literature research gave us information on the floor panel options. Additionally, this research has aided our team in providing direction for the remainder of this senior project. The previous research helped us see the future of innovation for the floor tile as a strength and water absorption.

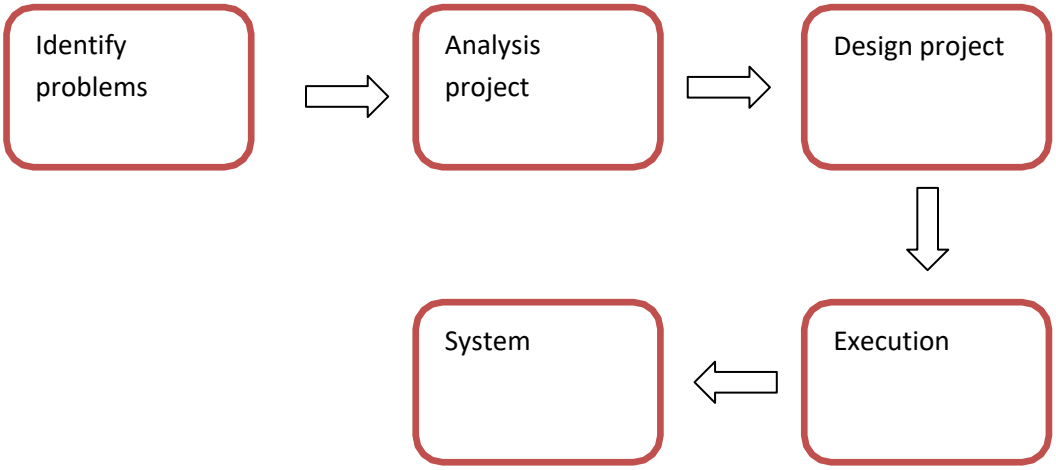
CHAPTER 3: METODOLOGY

3.1 PRELIMINARY

The methodology used for this study will be explained in this chapter. As a result, from the start of the project until its conclusion, this chapter will cover every step of the research process. This chapter will discuss every experiment and activity that took place during the research. The chapter concludes with a detailed discussion of the form of analysis that was chosen and the procedure employed to acquire the data.

3.2 RESEARCH DESIGN

This research will be carried out using experimental design:



3.2.1 Identify Problems

The use of cement in building results in air pollution from cement-based dust, which makes many employees at construction sites sick. Instead, use waste materials like coconut shell charcoal, which has several benefits for construction.

3.2.2 Analysis Project

In this project, our group will minimise the amount of cement used while increasing the amount of coconut shell charcoal powder that is added to the concrete mix to manufacture the floor tiles. Therefore, in this research, we are using four different percentages of coconut shell charcoal powder: 0%, 3%, 5%, and 10% of eggshell powder. This project includes two tests: a strength test and a water absorption test.

3.2.3 Design Project

The floor tile size is 30.48cm x 30.48cm x 1.27cm and cube mould size is 50mmx50mmx50mm in this project:

1)

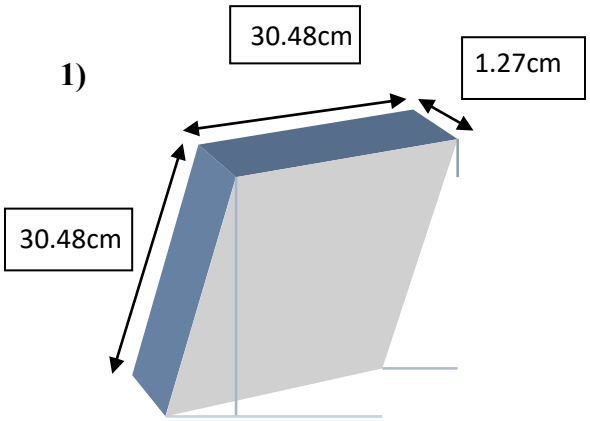


Figure1 1: Coconut Shell Charcoal Tile

This floor tile is subject to water absorb testing, and our group completed 8 pieces for the project because the tile's four percentages varied. We also included 0% eggshells to the mix to compare the water absorb stage to the tile's other percentages. charcoal and coconut shell tiles for this floor.

2)

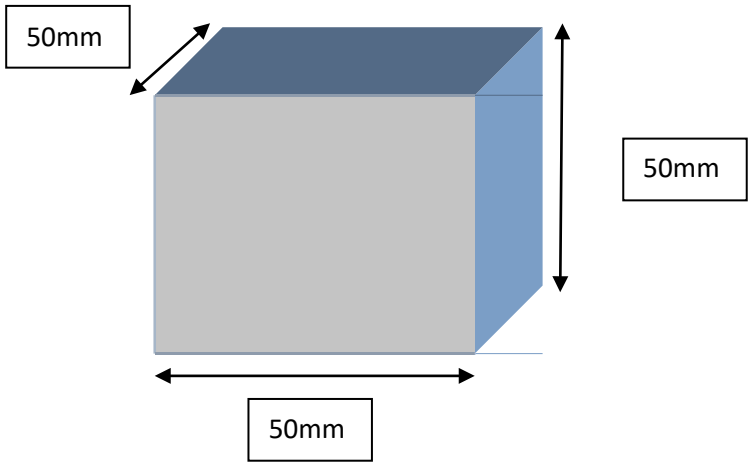


Figure 2: Cubes

This cube concrete is implicate to strength testing and our group do 48 cubes for this project because we add 0% coconut shell charcoal for compare strength to others percentage of cubes and we had mixed three cubes for each percentage to get average value.

3.2.4 Execution of Project

We used two different types of concrete for this project, including floor tiles and cube moulds. As a result, the project's execution took place at the Sultan Salahuddin Abdul Aziz Shah Brick Laboratory Polytechnic in Shah Alam. Due to the many types of days that must be completed for each cube—7 days, 14 days, and 28 days—this project takes roughly two months to finish. Additionally, we conducted two tests: a water absorbency test and a strength test. The Polytechnic used the moisture content method to acquire data for the water absorbency tests, while Makmal Konkrit Dan Kejuteraan Awam BSEN Test Sdn. Bhd. used the compressive strength machine for the strength tests.

3.2.5 System

All of the testing data demonstrates that a cube of 3% coconut shell charcoal powder has greater strength at 14 days than other percentages. Additionally, the findings of the water absorption test indicate that all percentages are capable of absorbing water to the tune of 3.52%.

3.3 METHOD OF COLLECTING DATA

Interview

In the course of an interview, the subject or interviewee verbally provides the necessary information in a face-to-face setting. In many study contexts, it can be utilised successfully to gather pertinent data about individuals or groups. The inquiries ought to be precise, understandable, and conducive to comprehensive answers.

Focus Group

A focus group is a small-group discussion guided by a trained leader. It is used to learn about opinions on a designated topic, and to guide future action. Moreover, gathers information about combined perspectives and opinions. Responses are often coded into categories and analyse thematically. Every week, our group will meet with supervisor for sharing information about our research and asking for opinions to make our project more quality.

Internet

The internet is fantastic place to get information, it is provides information faster, easier and more efficiently than books and libraries. There are millions of websites and webpages to provide with lots of information. Therefore, internet has many research engines that can help narrow down the search. Moreover, our group will surfing the internet to gain new knowledge and search about understanding some topics. It is very help while do the report and log book.

3.4 RESEARCH INSTRUMENT

3.4.1 NAME OF APPARATUS

Name of Apparatus	Picture	Function
Trowel		To pick up mortar from a board and to place and spread the mortar into a mould or framework.
Shovel		Used to hold or carry sand, cement, mortar and concrete. It is also used to mix mortar and to lift mortar on working site.
Wheelbarrows		It can have a reliable way to move materials back and forth at sites. It will make everything awhole lot easier.
Mortar Board		It used for put the mortar while mixture

Concrete Edger		It used for the concrete is starting to harden up. It will have a nice surface.
Balance		To determine the mass of material that used in this project
Sand Filter		Removing the solids particle such as stone and small woods.
Yellow Pail or Bucket		It is used for carrying the materials.

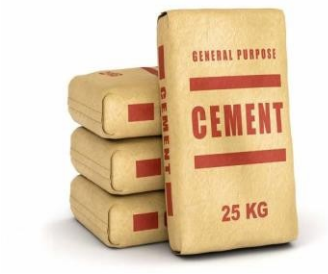
Nylon Brush		It used for apply oil at cube mould.

3.4.2 MATERIALS

i COCONUT SHELL CHARCOAL POWDER

Cleansed and dried coconut shell charcoal that has been blended into powder. Because eggshell granules are high in calcium, they provide concrete a strength that is almost identical to that of limestone. Concrete can benefit from using waste coconut shell charcoal instead of natural lime since it uses less cement, preserves natural lime, and makes use of waste. It also demonstrates how well it can absorb water. This is due to the fact that our studies on water absorption have shown positive results.

ii PORTLAND CEMENT



Portland cement is the type of cement in general use around the world as a basic ingredients of concrete, mortar, stucco, and non-specialty grout. It is a fine powder, produced by heating limestone and clay minerals. When mixed with water and sand it turns into masonry mortar and after a series of complex internal reactions, sets like stone. In this project, we used Portland cement.

iii SAND

Sand is two of important component in mixture concrete. A loose granular material that results from the disintegration of rocks consists of particles smaller than gravel but coarser than silt, and is used in mortar. The size of sand that usedin this mixture is less than 5mm and get from quarry and river.

iv WATER

The presence of water is very important in the mixing of concrete because function water in mixture is to conduct cement reactions and act to determine the workability of the concrete. Types of water that must use in mixture is taken from the source of it is purity and free from minerals, organic materials because it can damages the quality of the concrete such as chloride and sulphur causing the metalto adhere, reinforcement, and concrete. For generally, cement needs 32% weightof cement to work perfectly.

3.4.3 PROCEDURES OF MIXED WITH EGGSHELLS

3.4.3.1 PROCESS OF COCONUT SHELL CHARCOAL

1. Gather the coconut shells as much as can.

2. Break the eggshells into small pieces using a hard object.

3. Burn the coconut shells around 3 hours until it become a ash charcoal.

4. Collect coconut shells ash charcoal after coconut shells completely dried.

5. Make sure the coconut ash charcoal properties is same as the cement properties

3.4.3.2 PROCESS OF FRAMEWORK


1. Group members have gone to the Enchant Hardware for make a 30.48cmx30.48cmx1.27xm framework while the material of framework is from wood.

2. The framework was completed according to the size by the technician.

3.4.3.3 COCONUT SHELL CHARCOAL

Coconut shell charcoal counting mixed into formwork mixture for four floor tiles:

Percentage (%)	Sand (g)	Cement (g)	Coconut Shell Charcoal (g)
0	1000	500	0
3	1000	485	15
5	1000	475	25
10	1000	450	50

Table 1 shows the measure of material that we used.

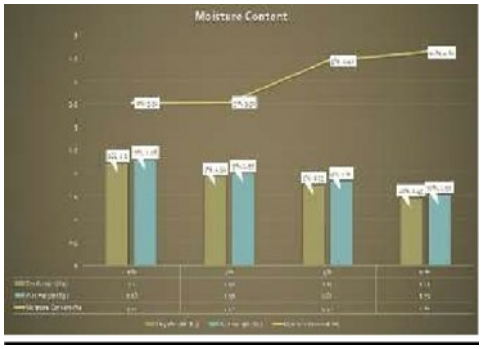
Procedures of Mixture Floor Tiles Coconut Shell Charcoal

- Prepare the mixture tiles mixture according to the calculation made for 0%,3%,5%,10%(sand,cement,coconut ash charcoal)

- Insert the cement and pebble wash into the formwork (1ft x 1ft x 0.5 ft)

- Curing the mortar mixture for testing in (0%,3%,5%,10%) percentage

- Perform the weight test in laboratory that can determine the water absorbation strength.



- Collect and analysis data

3.1.1.1 CUBE MOULD

Coconut Shell Charcoal counting mixed into mortar mixture for cubes:

Percentage of coconut shell charcoal	Sand (gram)	Cement (gram)	Coconut shell charcoal Powder(gram)
0%	600	300	0
3%	600	291	9
5%	600	285	15
10%	600	270	30

Table 2 shows the measure of percentages material that we used Procedure of Mixture Cubes

- Provide the complete equipment for concrete mixing.

- Measured quantity of material that we used in this project, follow the table at Table 2.

- Make a deep crater in the pile and add water as much as good the texture of mixture.

- Fold the mix in from the sides using trowel.


- Fill the mixture in the moulds and level the top surface and smoother it with a trowel and road

- Let it dry for 24 hours and after that remove from cube moulds. The cubes is guided by the types of days which 7days, 14days and 28days.

- After that, it can proceed to strength testing

3.1.2 PROCEDURES TESTING

3.1.2.1 TESTING STRENGTH

- Arrange cubes by percentages so that technician is easy to calculate the cubes.

- The technician measure mass all of the cubes.

- Place the specimen in the machine in such a manner that the load shall be applied to the opposite sides of the cube cast.

- Align the specimen centrally on the base plate of the machine.

- Apply the load gradually without shock and continuously till the specimen fails.

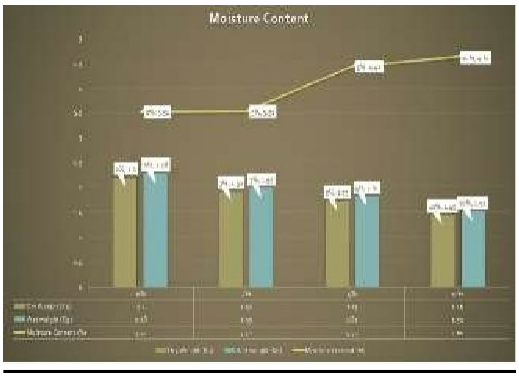
- The result has record on the maximum load. It needs note any unusual features in the type of failure.

3.1.2.2 TESTING WATER ABSORBS

- Perform the dry weight of the tiles in laboratory that can determine the water absorbation strength.

- Curing the floor tiles mixture in 5 minutes for determine the wet weight in (0%,3%,5%,10%) percentage.

- Perform the wet weight of the tiles in laboratory that can determine the water absorbation strength.



- Collect , Calculate and analysis data by using moisture content method for determine water absorbation strength.

3.2 METHOD OF DATA ANALYSIS

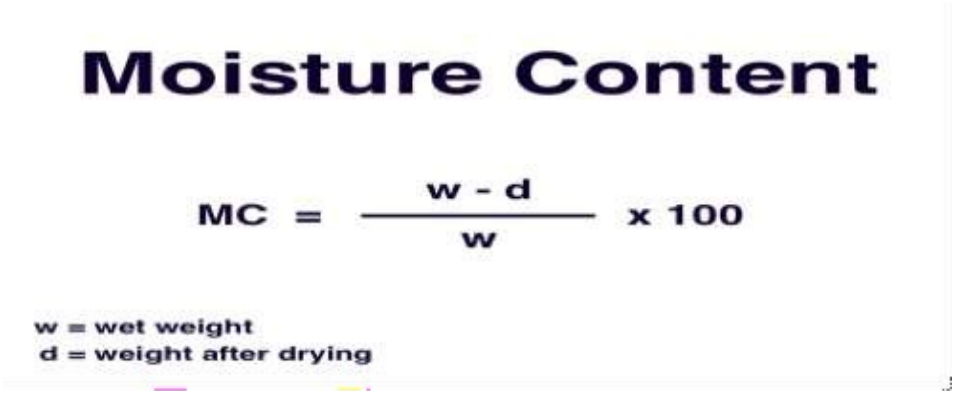
3.2.1 CUBE TEST

Compressive strength of concrete cube test provides an idea about all the characteristics of concrete. By this single test one judge that whether concreting has been done properly or not. Concrete compressive strength for general construction varies from 5 MPa (2200 psi) to 30 Mpa (4400 psi) and higher in commercial and industrial structures.
Compressive strength is the ability of material or structure to carry the loads on its surface without any crack or deflection. A material under compression tends to reduce the size, while in tension, size elongates**.**

3.2.1.1 Concrete Compressive Strength

3.2.2 MOISTURE CONTENT METHOD

The moisture content of soil also referred to as water content, is an indicator of the amount of water present in soil. Moisture content is the ratio of the mass of water contained in the pore spaces of soil to the solid mass of particles in that material, expressed as a percentage. A standard temperature of 110 ± 5°C is used to determine the mass of the sample.



3.2.2.1 Moisture Content Method

3.3 CHAPTER SUMMARY

This chapter looked at the research methodologies used in this research. Justifications on why there searcher chose to use those methodologies were given. Interviews and questionnaires were the main methods of data collection used to gather relevant data to achieve the research objectives. In data presentation, both qualitative and quantitative methods were used. Data was analysed using the inductive analysis, regression analysis and the deductive analysis technique

CHAPTER 4: RESULT

4.1 PRELIMINARY

The outcomes of both specimens can be found in this chapter. In light of the outcomes that will be presented in the findings, this demonstrates the viability of our proposal. Due to the importance of compressive strength and water absorption, we have included diagrams and numerous graphs in this chapter about the use of coconut shells and charcoal as aggregates in the manufacture of tiles.

4.2 Design

4.2.1 This diagram shows the Floor Tiles with size 1ft x 1ft

4.2.2 This diagram shows the Cube Test with size 50mm

4.1 FINDINGS

4.1.1 RESULTS TESTING OF COMPRESSIVE STRENGTH

Percentage	Strenght (N/MM2) 7 days	Density (kg/m3) 7 days	Strenght (N/mm2) 14 days	Density (kg/m3) 14 days	Strenght (N/mm2) 28 days	Density (kg/m3) 28 days
0 %	14.8	2160	11.6	2000	23.5	2000
3 %	11.8	2160	14.7	2080	16.9	2080
5 %	7.3	2080	14.3	2080	18.9	2080
10 %	6.5	2160	12.3	2080	13.6	2240

Table 2 shows the results of strength in 50mm and 20mm of size.

Table 2 in this research displays changes in compressive strengths over time for various percentages of coconut shell charcoal, including 0%, 3%, 5%, and 10% over periods of 7 days, 14 days, and 28 days. The outcome reveals that 0% in 50mm diameters has the highest compressive strength value after 7 days. Additionally, the compressive strength at 7 days has a weakening value of 10% in 50mm. This is because the lack of coconut shell charcoal additives and 28 days of storage make the cubes a little stronger than others, and more coconut shell charcoal cannot be added to prevent the concrete from becoming weak. The results then demonstrate that 0% at 28 days in 50 mm has the highest compressive strength rating. Additionally, the compressive strength weakness value at 7 days in 50mm is 10%. This is so that concrete may be made robust even without the addition of coconut shells. The outcome then reveals that 3% is the greater value for compressive strength after 14 days in 50mm diameters. Additionally, the compressive strength weakness value at 14 days in 50mm diameters is 10%. This is so that charcoal, which makes concrete robust without the addition of coconut shells, can be used. Additionally, the water content is lowered and all percentages are stronger after 14 days of storage compared to 7 and 28 days.

Graph for Compressive Strength of coconut shells charcoal variation.

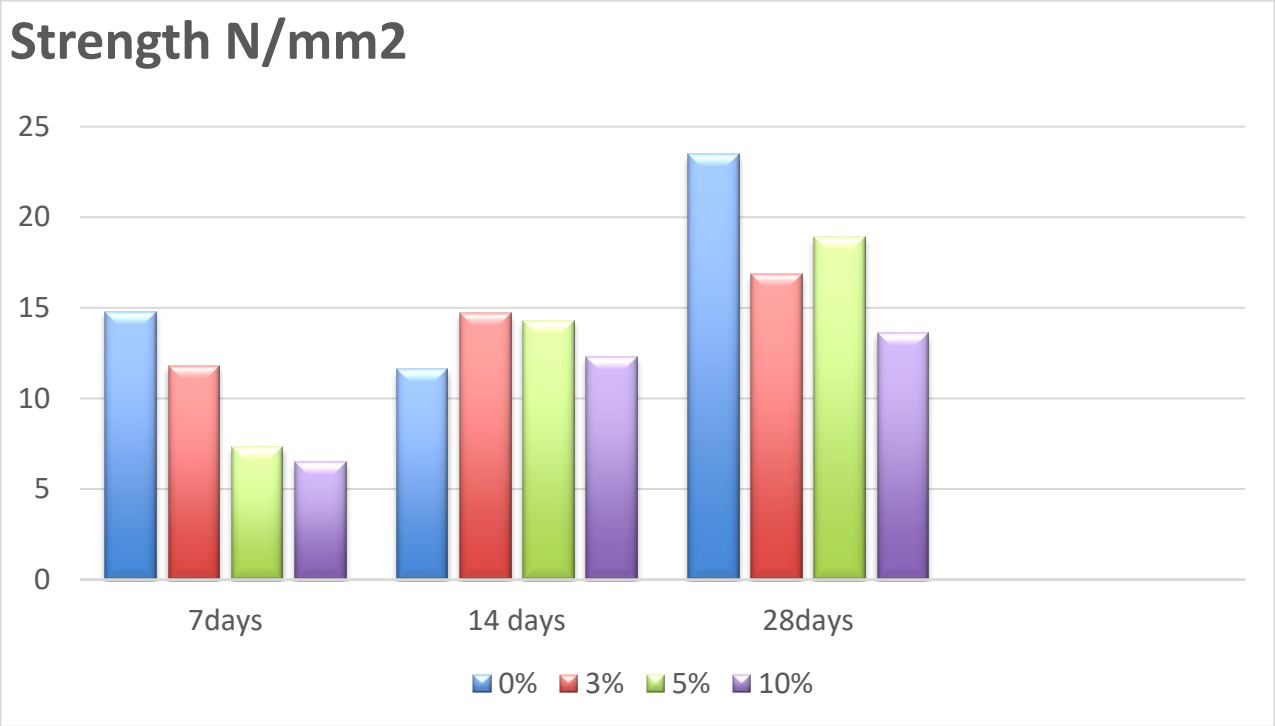


Figure 1 shows that 3% is the highest of strength at 14 days.

From the figure 1, the higher strength for 14days is 3% of coconut shells charcoal. Furthermore, for 7 days and 28 days, both of them are same strength which is 0% of percentage coconut shells charcoal.

4.3 RESULTS TESTING OF WATER ABSORB

Percentage of coconut shells charcoal (%)	Duration (5 minits)	Dry Weight (KG)	Wet Weight (KG)	Moisture Content (%)
0%	5 minits	2.2	2.28	3.51
3%	5 minits	1.92	1.99	3.52
5%	5 minits	1.73	1.81	4.42
10%	5 minits	1.45	1.52	4.61

This table shows the result average of water absorb testing. All the percentages of coconut shells charcoal have been testing 5 minits to get moisture content values.

Graph for moisture content testing of water absorb versus percentage of coconut shells charcoal.

Testing of water absorb versus percentage of coconut shells charcoal.

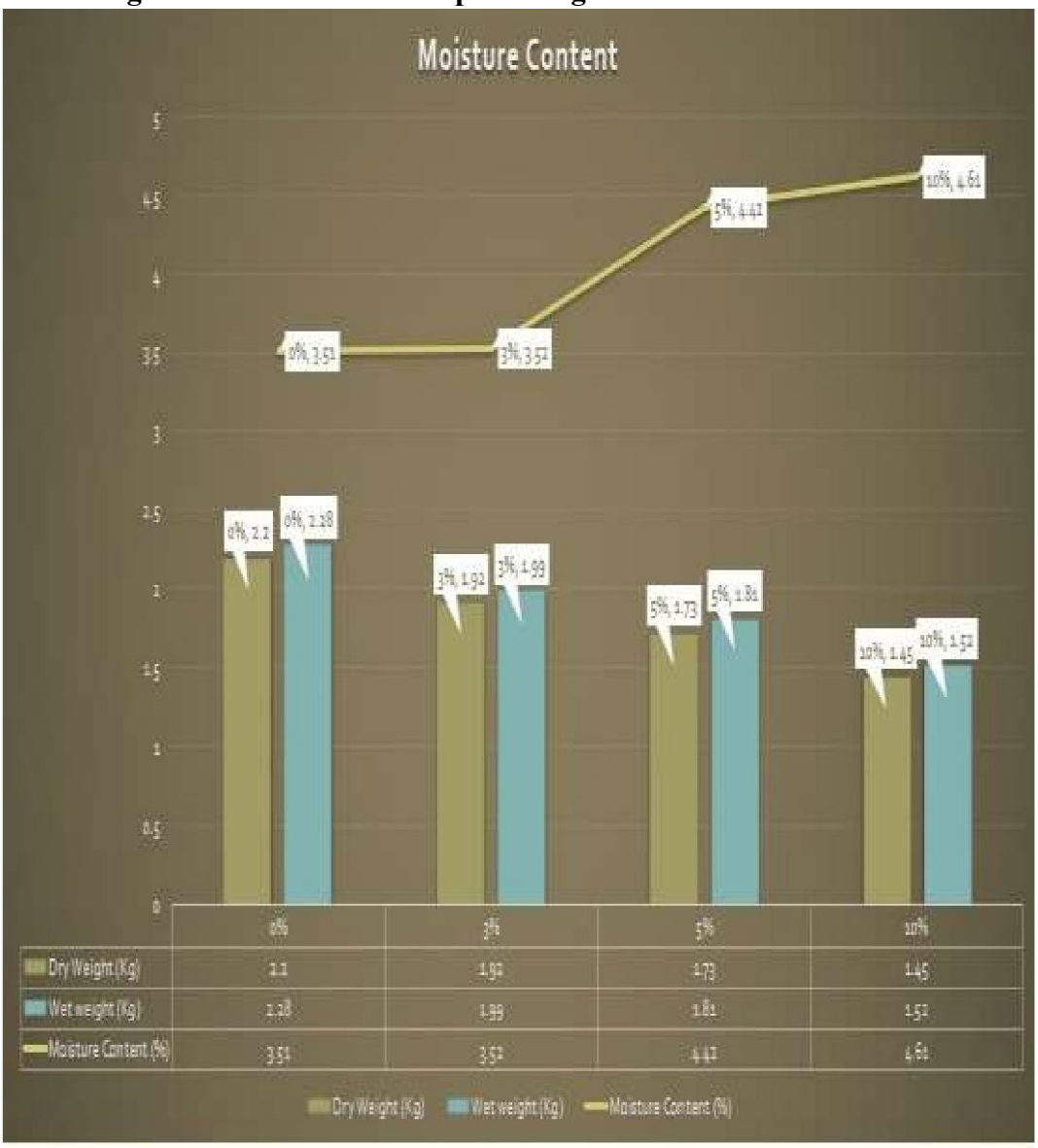


Figure 2 shows the lowest is 0% that ability to absorbing water.

From the figure2, the lowest of water absorb is 0% of coconut shells charcoal and the highest is 10% of coconut shells charcoal. The testing water absorbs value, the durability and strength of the tiles is higher.

Rated of water absorbation tiles	
Non-vitreous	**Low density, High water absorption of more than 6.0% (Ceramic)**
Semi-vitreous	**Medium density, Medium water absorption of more than 3.0%, but less than 6.0% (Ceramic)**
Fully Vitrified	**High density, Low water absorption of more than 0.5%, but less than 3.0% (Gres Porcelain / Ceramic)**
Impervious	**Extremely high density, Very low water absorption of less than 0.5% (Porcelain)**

Resources : QMI Tile & Stone

According to the fact that tiles can absorb water at a rate of less than 6.0%, if the moisture penetration is too great, the tile may break. In contrast, porcelain tile has a low water absorption rate, which increases its strength and longevity. The amount of water that can lead to failure from cyclic salt assault and freeze-thaw is constrained by low water absorption. The percentage of water absorption indicates the body density of the tile. The suitability for indoor or exterior uses is closely correlated with water absorption.

All of the floor tiles are safe to use, according to the information we have gathered from water absorption tests using the moisture content method. The wall panel with 0% and 3% coconut shell charcoal floor tiles had the best value at 3.51% and 3.52%, while the mix of floor tiles with 5% and 10% coconut shell charcoal had the worst value at 4.42% and 4.61. The strength and durability of floor tiles are higher the lower the water absorption of a tile.

4.4 CHAPTER SUMMARY

In conclusion, this chapter demonstrated that the implementation is proceeding without a hitch in accordance with the suggested approach and adhering to all safety requirements set forth by the polytechnic. The graphs demonstrate that our effort was successful in achieving compressive strength and water absorption.

CHAPTER 5: DISSCUSSION AND CONCLUSION

5.1 PRELIMINARY

In this chapter have found that the research has been done obtained encouraging results where the percentage of 3% coconut shell charcoal content in the concrete mix for the production of floor tiles has a high compressive strength and a low water absorption rate.

5.2 DISCUSSION

In this project, all the theoretical background of coconut shell charcoal material testing is represented and it proves that coconut shell charcoal contained lime, silica, alumina, and iron oxide that can be effectively used as additional cementitious materials. This shows that coconut shell charcoal is effective for the production of floor tiles. Furthermore, benefit from coconut shell charcoal because that have been used is a wasted product and thrown into landfills.

5.3 CONCLUSION

In short,this project gives new ideas to industrial people because from the experiments carried out and according to the effectiveness and results obtained by testing the coconut shell charcoal is very effective and reliable to apply it in the production of floor tiles.Furthermore,based on the compressive strength test on 3% sample shown there is a high difference between 0% coconut shell charcoal and another another percentage of coconut shell charcoal from the samples tested.In addition,coconut shell charcoal cannot be used as an additive in the production of 100% concrete,but it is suitable for the water absorption rate same as other original tiles due to its low absorption rate and is suitable for the production of floor tiles.

5.4 SUGGESTION

It is suggested that coconut shell charcoal can be used as an additive in the production of concrete at an additive level of 3%. Further research should be done on different thickness levels of floor tiles, maybe they are more absorbent than before. Further studies should also be conducted to ascertain the prospect of using coconut shell charcoal as an additive and as a substitute cement in concrete at different additive levels.

5.5 CHAPTER SUMMARY

In this chapter,it shows a lot of progress in this project from initial testing process to the end. It is very interesting and helpful for practical experiments and acquiring new knowledge.

REFRENCES

- **PENGGUNAAN ARANG TEMPURUNG KELAPA YANG DIAKTIFKAN UNTUK MENYERAP ZAT WARNA LIMBAH CAIR INDUSTRI KAIN TRADISIONAL :**

file:///C:/Users/abelo/Desktop/DCC40181%20FYP%201%20&%202/318772- penggunaan-arang-tempurung-kelapa-yang-d-8f8b52bb.pdf

- **Construction and Building Materials**

Mechanical and bond properties of coconut shell concrete: http://www.elsevier.com/locate/conbuildmat

- **IOSR Journal of Engineering (IOSRJEN)**

Compressive Strength of Concrete by Using Coconut Shell: file:///C:/Users/abelo/Desktop/DCC40181%20FYP%201%20&%202/393179947- coconut-shell-pdf%20(1).pdf

- **Journal of Advanced Research in Engineering Knowledge**

Sustainable Organic Materials Flooring Tile from Coconut Shell as Aggregate: file:///C:/Users/abelo/Desktop/DCC40181%20FYP%201%20&%202/AREKV7_N1_P41_45%20(1).pdf

- **INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 1, ISSUE 8, SEPTEMBER 2012:**

Coconut Shell Ash As Partial Replacement of Ordinary Portland Cement In Concrete Production: file:///C:/Users/abelo/Desktop/DCC40181%20FYP%201%20&%202/Coconut-Shell- Ash-As-Partial-Replacement-of-Ordinary-Portland-Cement-In-Concrete-Production.pdf

APPENDIXS

APPENDIX - GANTT CHART (SEMESTER 4)

GANTT CHART

DCC 40181 FINAL YEAR PROJECT

STUDY ON THE USE OF COCONUT SHELL CHARCOAL IN THE MANUFACTURE OF FLOOR TILES

CIVIL ENGINEERING DEPARTMENT

SESSION	SESSION 2 2021/2022															
WEEK	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
DISCUSSION SESSION																
DISCUSSION ON THE PROJECT TITLE																
CHOOSING THE PROJECT TITLE																
PREPARATION FOR DEFEND PROPOSAL																
DEFEND PROPOSAL																
DISCUSSION ON LITERATURE REVIEW																
PRESENTATION PROGRESS (TOPIC 1 INTRODUCTION)																
DISCUSSION ON PREPARATION OF METHODOLOGY																
PRESENTATION FINAL PROPOSAL																
SESSION	SESSION 1 2022/2023															

GANTT CHART (SEMESTER 5)

GANTT CHART

DCC 40151 FINAL YEAR PROJECT

STUDY ON THE USE OF COCONUT SHELL CHARCOAL IN THE MANUFACTURE OF FLOOR TILES

CIVIL ENGINEERING DEPARTMENT

SESSION	SESSION 2 2021/2022															
WEEK	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
DISCUSSION SESSION																
DISCUSSION ON THE PROJECT TITLE																
CHOOSING THE PROJECT TITLE																
PREPARATION FOR DEFEND PROPOSAL																
DEFEND PROPOSAL																
DISCUSSION ON LITERATURE REVIEW																
PRESENTATION PROGRESS (TOPIC 1 INTRODUCTION)																
DISCUSSION ON PREPARATION OF METHODOLOGY																
PRESENTATION FINAL PROPOSAL																
SESSION	SESSION 1 2022/2023															
WEEK	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16
LABORATORY SESSION																
PREPARATION THE MATERIAL																
CONCRETE CASTING																
CONCRETE TESTING																
ANALYSIS OF CONCRETE RESULT																
FINAL PRESENTATION																

APPENDIX B-BUDGET EXPENDITURE

4

Expenditure	**Cost**	**Amount**	**Notes**
All of material and equipment that used: **a. Nails** **b. Plywood** **c. Wood Stick** **d. Testing**	 **RM 10.00** **RM 10.00** **RM 10.00** **RM 180.00**	 **RM 210.00**	 Everyone pays the value. (*Done pays*)
Transportation **a. Motor**	 **RM 40.00**	 **RM 40.00**	
Paper Work **a. Print**	 **RM 50.00**	 **RM 50.00**	
Total		**RM 300.00**	