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Analysis & Comparison Between Waste Ceramic Concrete and Coconut Shell Concrete

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Abstract **. Coconut Shell:- Due to the rising demand for concrete, natural stone deposits have been dramatically reduced in construction projects utilising normal weight materials like gravel and granite, which has harmed the ecosystem and led to an ecological imbalance. It is necessary to investigate and discover an appropriate replacement material to replace the natural stone.**

Ceramic material:- Most ceramic waste is disposed of in landfills, which contaminates groundwater and renders nearby land infertile. Studying the impact of recycled ceramic as fine, coarse aggregate and ceramic fume as a replacement for conventional material on the characteristics of concrete and cement matrix is the goal of this project. In this study, the impact of using ceramic waste in place of conventional material on concrete's workability, compressive strength, flexural strength, elastic modulus, split tensile strength, and adhesive strength is thoroughly investigated.

Index Terms**—** waste ceramic concrete and coconut shell concrete

I INTRODUCTION

1.1 GENERAL:- As a result of global infrastructure development initiatives, concrete use is growing rapidly. One of the most frequently utilised construction materials worldwide is concrete. Approximately ten billion tons of concrete is produced every year. There are also drawbacks to increased concrete manufacturing, such as the depletion of natural resources and ecological imbalance caused by continual, massive extraction of aggregate from them. To make concrete more affordable and to promote sustainable development, so many academics are looking for alternatives to coarse aggregate. More than 100 nations grow coconuts. India is the third-largest producer of coconuts, with around two million hectares under cultivation. The aim of this study is to determine the compressive strength of concrete made with coconut shell as a partial replacement for coarse material.

The use of ceramic materials in current buildings, such as tiles, sanitary fittings, electrical insulators, etc., is rising daily. However, because ceramic materials are brittle, a significant amount of them are wasted during processing, transportation, and fixing. Therefore, utilising these wastes in the manufacturing of concrete could be a useful strategy for preserving the environment and enhancing the qualities of concrete. Hence, the crushed waste ceramic tiles were used in concrete as a replacement for natural coarse aggregates with 25% of substitution.

1.2 OBJECTIVE:-

- This project is experimented to reduce the cost of concrete.
- The use of waste product in concrete not only makes it economical but also solves some of the disposal problems.
- Due to extensively use of concrete which leads to an increase in cost of materials. Therefore an alternate materials is used for partial replacement of coarse aggregate inconcrete.

1.3 SCOPE OF THE WORK :-

There has been a significant amount of research done on the later reuse of concrete waste, especially earthenware tile waste. The following references list potential research studies that should be possible

The time constraint was one of many restrictions on our study. Before actually implementing our concept, the coconut shell concrete's durability qualities need to be evaluated. Durability testing on CSC, which could take a year to complete, could be done in the future. The aggregate qualities of coconut shells and their individual strength characteristics determine the CSC's strength properties. To examine the strength characteristics of coconut shells, experiments on impact value, crushing value, etc. can be carried out. The surface bonding between coconut shell aggregates and steel comes into play when CSC is used in conjunction with reinforcement. Consequently, research on these bonds' bond characteristics can be helpful.

II. LITERATURE REVIEW

2.1. VEERA REDDY(2010)

She found out that the impact value of ceramic was 18.2 and crushing value of ceramic scrap was 24.7% respectively .these values found out were within the permissible limits according to Is 383-1970, hence she concluded that it is safe to use tile aggregate as coarse aggregate in concrete composition.

2.2. SENTHARAMAI(2005)

Sentharamai concluded that ceramic tile waste can be effectively used as aggregate in concrete making , due to its strength. He found out that the crushing value as 27, impact value as 21,abrasion value was 28% for ceramic and for natural coarse aggregate these were 24,17,20% respectively. At last they concluded that ceramic does not have much variation with respect to the natural aggregates.

2.3. KALYANAPU RAO(2015)

The aim of this work is to provide more data on the strengths of coconut shell concretes at different coconut shells replacement and study the transport properties of concrete with coconut with coconut shells as coarse aggregate replacement .

III. PROBLEM IDENTIFICATION Coconut shell concrete

the intention is to raise awareness about using coconut shells in place of traditional coarse aggregate. while we continue to make technological progress. These technical breakthroughs will enable us to replace the heavy materials currently used in concrete production with lighter ones.

1. It will lessen the depletion of natural resources by maintaining ecological balance.
2. Because coconut shell is a lightweight material, it will aid in lowering the structure's overall weight.
3. It is inexpensively and simply accessible in nature. Therefore, offering a low-cost framework will be beneficial.

Waste ceramic concrete

1. Concrete made with ceramic waste as coarse aggregate shows good workability, compressive , tensile and flexural strengths and modulus of elasticity.
2. It has lower specific gravity and a greater absorption ratio than quarried aggregate.

IV. METHODOLOGY

4.1 MATERIAL

Coconut shell	Ceramic Material	Coarse Aggregate
		

4.2 MIX METHODOLOGY

Measurement of ingredients

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Mixing of concrete

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Placing of concrete

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Finishing of concrete

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De-moulding of specimens

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Curing of specimens

V. EXPERIMENTAL WORK

5.1 Aggregate crushing value test

The resistance of the aggregate to gradual loading is what is meant by the term "aggregate strength." The Crushing Value Test on aggregates is used to Determine an aggregate's strength.

Fig:- aggregate crushing value test

5.2 Aggregate Impact Value test

The capacity to withstand impact loading is referred to as the aggregate's toughness. Impact Value Test on aggregates determines the aggregate's toughness.

Fine Aggregate	Cement	Water
		

Fig:-aggregate impact value

5.3 Abrasion value test

The ability of aggregate to resist abrasion is a result of its hardness. The Deval Abrasion Test, Dorry's Abrasion Test, and Los Angeles Abrasion Test can all be used to determine an aggregate's hardness.

Fig. Abrasion test

5.4 Water absorption test

A measure of aggregate strength is provided by water absorption. In general, unacceptable aggregates are those that absorb more water and are hence more porous, unless they pass the necessary strength, impact, and hardness tests.

fig:- water absorption test

5.5 Slump cone test

The purpose of the concrete slump test, also known as the slump cone test, is to assess the workability or consistency of the concrete mix produced in the laboratory or on the construction site as the project is being carried out.

Fig:- slump cone test

5.6 Compressive strength test

The ability of a material or structure to support loads on its surface without cracking or deflecting is known as compressive strength. When a material is compressed, its size tends to decrease, and when it is stretched, its size elongates.

Fig:- compressive strength test

VI. RESULT & DISCUSSION

6.1 AGGREGATE CRUSHING VALUE

- Crushing value of waste ceramic aggregate =23.62 %
- Crushing value of Coconut shell aggregate =18.33 N/MM2

6.2 AGGREGATE IMPACT VALUE

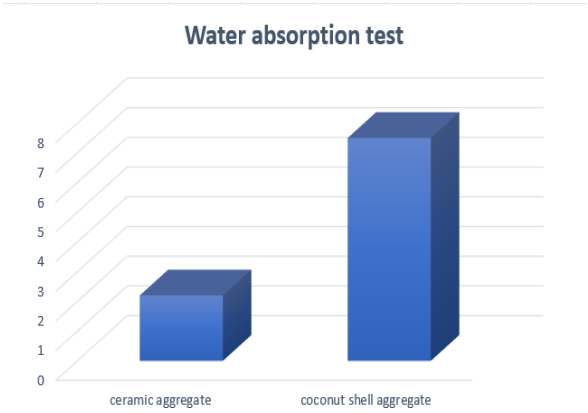
- Aggregate impact value waste ceramic aggregate = 18.66%
- Aggregate impact value Coconut shell aggregate = 9.51%

6.3 ABRASION VALUE

- Abrasion value waste ceramic aggregate = 19.6 %
- Abrasion value Coconut shell aggregate = 5%

6.4 WATER ABSORPTION TEST

- Water Absorption test waste ceramic aggregate = 2.20 %
- Water Absorption test Coconut shell aggregate = 7.50%



6.5 SLUMP CONE TEST

- Slump cone test waste ceramic aggregate = 45.00MM
- Slump cone test Coconut shell aggregate = 33.33MM

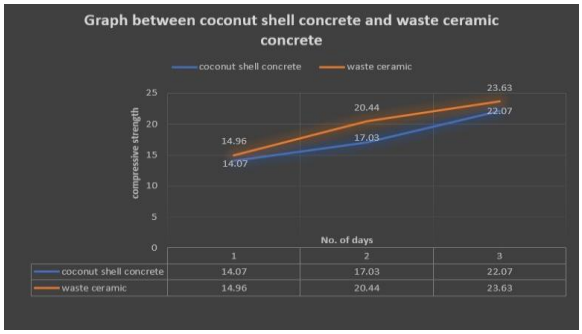
6.6 COMPRESSIVE STRENGTH

- Compressive strength waste ceramic aggregate

a. 7 DAYS = 14.96 N/MM2
b. 14 DAYS = 20.44 N/MM2
c. 28 DAYS = 23.63 N/MM2

- Compressive strength Coconut shell aggregate

a. 7 DAYS = 14.07 N/MM2
b. 14 DAYS = 17.03 N/MM2
c. 28 DAYS = 22.07 N/MM2



VII. CONCLUSION

1. The workability of concrete increases with the increase tile aggregate replacement

2. The properties of concrete for 28 days decreased linearly with the increase in coconut shell and ceramic aggregate up to 15% replacement.

3. Coconut and ceramic waste can effectively be used as alternative & supplementary materials in concrete. Optimum replacement level of coarse aggregate with waste is 15%.

4. It is interesting to note that replacement of natural coarse aggregate by coconut shell and waste ceramic resulted in the increase of compressive strength compared to conventional concrete

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