Partial Replacement of Coarsed Aggregate by Coconut Shell And Waste Marble Powder as an Admixture

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Abstract- *Living the waste material to the environment directly can cause environmental problem. Hence the reuse of waste material has been emphasize. Waste can be used to produce new product or can be used as admixture so that natural resources are used more efficiently and the environment is protected from waste deposit. This requirement is drawn the attention of investigators to explore new replacement of ingredients of concrete. The present technical report focuses on investigating characteristics of concrete with partial replacement of coarse aggregate and cement with coconut shell and waste granite powder. The topic deals with the usage of coconut shell and waste granite powder and advantages as well as disadvantages in using it in concrete.*

Keywords- Marble dust, Coconut shell, Environmental problem, Admixtures, Concrete.

I. INTRODUCTION

Coconut Shell

Concrete is a most widely used construction material it is a composite material composed of aggregate, cement and water. As we know that there is some negative impacts in production of concrete due to continuous extraction from natural resources will lead to depletion and environmental problem. Due to this researcher are in search of replacing coarse aggregate to make concrete less expensive and good for ecological balance. After doing researches they find coconut shell as a partial replacement of coarse aggregate which is cheaper in cost and has good strength as well. By using coconut shell as coarse aggregate we can make lighter and low cost concrete. The use of coconut shell as a partial replacement is used where it is present in huge amount such as in south Indian villages for low cost housing and they are eco-friendly.

Marblepowder

Marble has been commonly used as a building material since the ancient times. Consequently, Marble waste as a by-product is a very important material which requires adequate environmental disposal effort. In addition, recycling waste without proper management can result in environmental problems greater than the waste itself.

Marble powder is generated during the cutting process. The result is that about 25% of the original marble mass is lost in the form of dust..

Marble powder can be used as an admixture in concrete, so that strength of the concrete can be increased. The production of cheaper and more durable concrete using this waste can help the civil engineer fraternity to ensure economy in the infrastructural project and redress the environmental degradation problem.

APPLICATIONS

- It is light weight aggregate, it has more resistance against crushing, impact and abrasion as compared to conventional aggregate.
- It is used for making low cost house, which helps in controlling the problems of ecological imbalance and environmental pollution.
- There is no need to treat coconut shell before using except water absorption test on coconut shell.
- Marble dust can be use as a filter in concrete and paving materials and help to reduce total void content in concrete.
- Marble dust is also used for manufacturing of white cement.

II. LITERATURE REVIEW

Vishwas P. Kukarni, Sanjay kumar B.Gaikwad (2013)[3]

Aggregates provide volume at low cost, comprising 66 percent to 78 percent of the concrete. Conventional coarse aggregate namely gravel and fine aggregate is sand in concrete will be used as control. While natural material is coconut shell as course aggregate will be investigate to replace the aggregate in concrete.

In this studies, three different concrete mixes with different the combination of natural material content namely 0%, 10%, 20%, 30%.Three sample specimen will be prepared for each concrete mixes. The aim behind this is to use low cost material like coconut shell and thus taking close to the concept of low cost housing. All precaution is taken to maintain serviceability, strength and durability of the members. Thus it will be helpful for civil engineers and society to adopt this concept to fulfill the basic need of human that is housing.

Daniel Yaw-Osei(2013)[5]

The rising cost of construction materials in developing countries has necessitated research into the use of alternative materials civil engineering construction. In this study, a concrete mix of 1:2:4 was used as control, while coconut shells were used to replace crushed granite by volume. Seventy two cubes were produced and the densities and compressive strengths were evaluated at 7 days, 14 days, 21 days and 28 days. The density and compressive strength of concrete reduced as the percentage replacement increased. Concrete produced by 20%, 30%, 40% and 50% and 100% replacement attained 28-day compressive strengths of 19.7 Nmm-2, 18.68 Nmm-2, 17.57 Nmm-2, 16.65 Nmm-2 and 9.29 Nmm-2; corresponding to 94%, 89%,, 85%,79.6% and 44.4% of the compressive strength of the control concrete. The results of the study showed that concrete produced by replacing 18.5% of the crushed granite by coconut shells can be used in reinforced concrete construction. A potential exists for the use of coconut shells as replace conventional aggregate in both conventional reinforced concrete and lightweight reinforced concrete construction.

Dewanshu Ahlawat, L.G.Kalurkar(2014)[1]

The rising cost of construction material is a matter of concern. The reason for increase in cost is high demand of concrete and scarcity of raw material. Hence the concrete technologists must search for some economical alternative to the coarse aggregate. In this study, M 20 grade of concrete was produced by replacing granite by coconut shell. Forty five cubes were casted and their compressive strength and workability were evaluated at 7, 14 and 28 days. The compressive strength of concrete reduced as the percentage replacement increased. Concrete produced by 2.5%, 5%, 7.5%, 10% replacement attained 28 days compressive strength of 19.71,19.53,19.08,18.91 respectively. These results showed that Coconut shell concrete can be used in reinforced concrete construction.

Miss. Anjali s. Kattire, Miss. Priyanka A. Bhujugade (2014-2015)[2]

The rising cost of construction material is a matter of concern. The reason for increase in cost is high demand of concrete and scarcity of raw material. Hence most of the researchers have focus on use of the waste materials in concrete according to their properties. In this study, M 20 grade of concrete was produced by replacing by coconut shell. 8 cubes and 8 cylinders were casted and their compressive strength and tensile strength were evaluated at 28 days.

The compressive strength and tensile strength of concrete reduced as the percentage replacement increased. Concrete produced by 0%, 10%, 15%, 20% replacement of coarse aggregate by coconut shell attained 28 days compressive strength and split tensile strength.

Apeksha Kanojia(2015)[4]

Different waste materials such as fly ash, silica flumes, copper slag, brick bat, demolished concrete has been successfully employed to produce various materials for building construction such as concrete, flush door, plywood, jute boards etc. Aggregate is a major ingredient for making concrete, occupy almost 70-80% part of concrete. Conventionally crushed rocks are used as coarse aggregate and river sand as fine aggregate. Both are naturally available material. Due to rapid growth of construction activities, conventional aggregate sources are depleting very fast leading to significant increase in cost of construction. For sustainable development, these materials should be used wisely and alternative materials need to be searched to replace conventional aggregate. Large number of studies has been done to search alternative materials for production of concrete

III. MATERIALS AND METHODS

Cement

Ordinary Portland cement of 43 grade (Ramco) conforming to IS 8112-1989 is used. Table 1 shows the test results of basic properties of cement

Water

Ordinary portable water is used in this investigation both for mixing and curing.

Concrete Mix Design

Different mix proportions were made for each mix with water- cement ratio of 0.45.

Batching of Materials

Weight batching and machine mixing are adopted in this study for concrete production.

Fine aggregate

Artificial sand of size below 4.75mm conforming to zone II of IS 383-1970 is used as fine aggregate.

Coarse Aggregate

Natural crushed stone with 20mm down size is used as coarse aggregate.

Table no 1: Raw Material Testing

Sr.no	Test	Unit	S1	S2	S3	Mean
1	Specific gravity(F.A)	-	2.68	2.74	2.89	2.77
2	Fineness modulus	-	4.46	4.49	4.50	4.48
3	Silt content	%	2.74	3.89	3.76	3.46
4	Flakiness index	%	7.98	9.05	8.11	8.38
5	Elongation index	%	8.66	7.87	9.83	8.78
6	Specific gravity (C.A)	-	1.95	3.12	2.85	2.64
7	Crushing value	-	6.98	9.12	6.84	7.64

Table no 2: Mix Proportion

Mix Design	% of C.S	% of M.P	Avg. strength at 3days(KN/m^2)	Avg. strength at 7days(KN/m^2)	Avg. strength at 28days(KN/m^2)
M1	-	-	19.55	28.42	47.59
M2	8%	-	29.46	38.33	51.23
M3	12%	-	17.23	25.69	39.72
M4	18%	10%	15.05	22.39	33.77
M5	18%	25%	14.12	17.89	29.33

IV. RESULTS AND DISCUSSIONS

Compression Test

Mechanical behaviors of concrete cube prepared with chemical admixtures was studied by compressive test (Grade M40 and curing time of 3 days , 7 days and 28 days).It can be noticed that 8% ,12% replacement of coarse aggregate with coconut shell and 25%,10% replacement of cement with marble dust, are showing increase in compressive strength. The text of this chapter deals with their result derive during the study and discussion on their interpreting. The derive result are presented above;

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