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AN EXPERIMENTAL RESEARCH ON PROPERTIES OF CONCRETE WITH RICE HUSK ASH AND M-SAND

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ABSTRACT

Utilization of rice husk Ash in cement diminishes cost as well as improves durability and obstruction against raised temperatures. What's more, utilization of M-Sand rather than common waterway sand isn't just the substitute it additionally gives more quality as contrast with normal stream sand and it is effectively accessible. M-Sand is made of squashed stones in standard size. The globe rice gather is evaluated in 500 M tons for each year, and India is a second maker. The use of RHA in cement is ecological agreeable and decreases the carbon dioxide emanation. The exhibition of RHA concrete is essential to inspect to make certain that it tends to be utilized in position of a typical clump of bond. Every one of the activities must be estimated on an alternate premise already, however there are some recognizable qualities of RHA bond that may helpful for specific areas, circumstances, or undertakings.

Keywords: Compressive Strength, Rice husk ash, M-Sand, Concrete, Workability.

I. INTRODUCTION

Rice husk ash is a by-product from the burning of rice husk. The rich land and tropical atmosphere make for ideal conditions to develop rice and is taken advantage by these Asian nations. Rice husk is amazingly basic in East and South-East Asia due to the rice generation around there. The husk of the rice is isolated in the cultivating procedure before it is sold and expended. It has been discovered helpful to copy this rice husk in furnaces to make an assortment of things [1].

Concrete is outstanding as a heterogeneous blend of bond, water and totals. The admixtures might be included cement so as to improve a portion of the properties wanted uncommonly. Cement is a blend of bond slurry and totals. Different materials are included; for example, fly powder, rice husk ash and admixture to get concrete of

wanted property. The idea of the solid is dictated by nature of the concrete slurry. The answer for accomplish a tough, solid cement absolutely relies upon the cautious clustering, blending and compacting. The point by point test examination done to think about the impact of halfway supplanting of bond with RHA & 100% supplanting of common stream sand with M-Sand on cement [2].

An India is a noteworthy delivering nation, and the husk creates during granulating of rice in factory. It is commonly utilized as a fuel really taking shape procedure of paddy, creating/producing vitality from direct burning or by gasification. Around 20 million tonnes of RHA is delivered every year in India. This RHA is an extraordinary domain peril making harm the land and the encompassing region where it is dumped. In the present examination, bond is supplanted by RHA at various rates running from 0 % to 15 % to ponder its impact on compressive, split elastic and flexural quality [3].

This exploration is gone for putting into significant utilization of Rice Hush Ash a nearby added substance which has been researched to be super pozzolanic in a decent rate to reduce the surprising expense of basic cement. Rice Husk Ash is a farming waste item, and how to discard it is an inconvenience to squander directors. While Concrete today have expected the spot of the most broadly utilized material of all inclusive. The costly solid material is bond (fastener) and if such costly material is mostly supplanted with local natural & cheep ingredient like RHA won't just deal with waste administration however will likewise decrease the trouble of surprising expense of cement and lodging. There is emerging significance to secure the earth in the present day world. RHA from the parboiling plants is presenting genuine natural risk and ways are being thought of to arrange them [4].

Experimental investigation on high performance concrete using M-sand, as a result it is found that M-sand can be use as fine aggregate instead of natural sand. At 50% replacement of m-sand in concrete gives the higher strengths compare to normal conventional concrete [5]. After a deep study of rice husk ash as a substitute material to cement, various percentages from 5% to 30% is been replaced to study the behavior of concrete, they review that replacement of 10% rice husk ash results in high strength of concrete compare to other percentage of rice husk ash [6-7].

In India husk is produced by rice mills. This husk waste is burn in mills as fuel for stream producing for boiling. In this paper the replacement of RHA is done at 0% & 20%, it is found that the workable concrete with 0% RHA is no more workable with 20% RHA replacement. But the compressive strength of 20% RHA is noticed to be higher than 0% RHA content [8]. Because of quick advancement, lack of stream dismal. The best option for this is manufactured sand which is wealthy in accessibility and less in value contrast with stream sand. In this exploration investigation of 0%, 5%, 10%, 15%, 20%, 25% of supplanting stream sand with M sand is completed with grade M20.It is discovered that expansion in compressive quality with 15% supplanting of M sand with waterway sand [11].

A few choices for stream sand is especially important, as manufactured sand is one which establishes as a supplanting material to waterway sand. They investigated that use of manufactured sand instead of Natural River sand gives more strength. Both sand having almost same properties. The tests like specific gravity,

compressive strength, split tensile and flexural strength test will give greater value then the natural river sand. Using M-sand preserves the water bodies for future, and to promote eco-friendly construction [12].

II. MATERIALS AND METHODOLOGY

2.1 Materials Used

2.1.1 Cement:

The cement used islOPC-53Grade with a specific gravity 3.150. Initial setting & final setting time is 50minutes & 365minutes.

2.1.2 Fine Aggregate:

Locally available M-Sand belonging to Zone-2 & Natural sand of Zone-3 of IS:383:1970 is used for the present work.

2.1.3 Coarse Aggregate:

Crushed ballast stones of size 20mm down confirming to IS 383-1970 are used in this dissertation.

2.1.4 Rice Husk Ash:

Investigations are made on rice husk ash procured from Raichur. It is tested for physical properties mainly specific gravity and fineness.

2.1.5 Super plasticizer:

Buildplast-150, Specific gravity-1.140. super plasticizer and water reducing admixture for concrete.

2.2 Methodology:

- Procurement of RHA from the rice sellers.
- Testing of RHA specific gravity, physical state, particle size, odor color, appearance etc.
- Preparation of design mix of M40 grade using relevant IRC code.
- Preparation of concrete mix using rice husk ash as replacement of cement by 0%,5%,10%,15%
- Preparation of concrete mix using M-Sand replacing Natural River sand.
- Comparative study of compressive, flexural, split tensile strength of concrete mix thus prepared.

2.3 Proportioning:

- Grade: M40
- Type of Cement: OPC 53 grade confirming to IS 8112
- Maximum Nominal Size of Aggregates: 20 mm

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III. RESULTS AND DISCUSSIONS

3.1 Tests on Materials

3.1.1 Cement:

Table 3.1: Tests on Cement

Sl. No	Properties	Obtained Value
1	Fineness test	4.68%
2	Normal Consistency	33%
3	a)Initial setting time b)Final Setting time	35min 600min
4	Sp. Gravity	3.15
5	Normal consistency	33%

3.1.2 Fine Aggregates:

Table 3.2: Tests on Fine Aggregates

Sl.No	Properties	M-sand	River Sand
1	Fineness Modulus	3.20	2.90
2	Specific Gravity of sand	2.69	2.66
3	Silt content	3.47<5%	4.3<5%
4	Water absorption	1.6	1.5
5	Density compacted ($Kg/m^{3)}$	1780	1669

3.1.3 Coarse Aggregates:

Table 3.3: Tests on coarse Aggregates

Sl.N0	Properties	Value.	Permissible
1	Crushing value	22.1%	30%
2	Impact Value	24.4%	30%
3	Abrasion value	14%	30%
4	Specific gravity	2.65	2.60-2.9
5	Fineness modulus	3.37	6.9
6	Water absorption	0.62	0.60
7	Elongation Index	12.12	15%
8	Flakiness Index	23.02%	25%

3.1.4 Rice husk ash:

Table 3.4: Tests on RHA

Sl.No	Description	Value
1	Sp.Gravity	2.110
2	Density of Rice husk Ash	1.80gm/cm^3
3	Percent passing 45 µm	92%
4	Fineness of RHA	4.62%
5	Colour→ Dark Black to light grey	

3.1.5 Compressive Strength Test:

Table 3.5: Average Compressive Strength of cubes for 3, 7 & 28 days in N/mm^2

Curing period	0%RHA-0%Msand	5%RHA-100%Msand	10%RHA-100%Msand	15%RHA-100%Msand
3 days	23.06	27.86	32.40	16.00
7 days	34.00	37.73	42.05	21.06
28 days	54.4	58.00	61.06	38.13

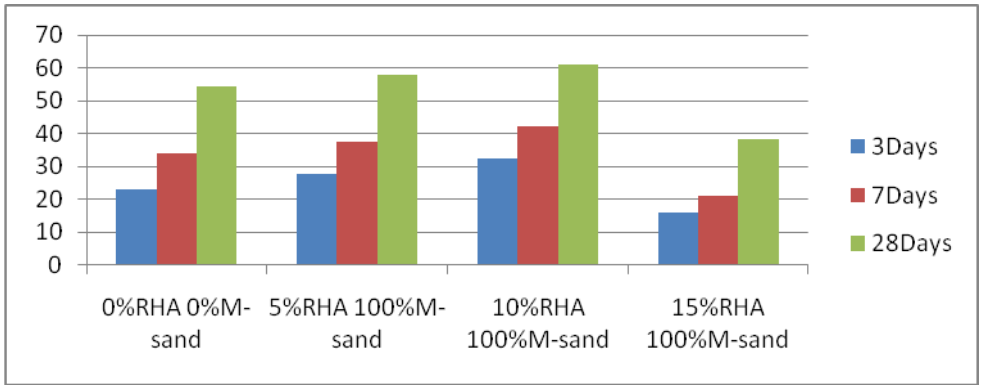

Figure No.3.1: Compressive Strength bar chart

3.1.6 Split Tensile Strength Test:

Table 3.6: Average Split Tensile Strength of cubes for 28 days in N/mm^2

Curing period	0%RHA-0%Msand	5%RHA-100%Msand	10%RHA-100%Msand	15%RHA-100%Msand
28 days	4.8	6.06	6.66	3.80

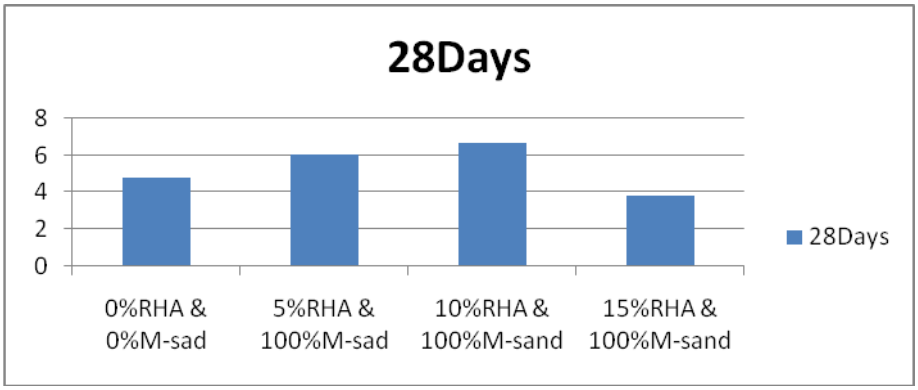

Figure No.3.2: Split Tensile Strength bar chart

3.1.7 Flexural strength Test:

Table 3.7: Average Flexural Strength of cubes for 28 days in N/mm^2

Curing period	0%RHA-0%Msand	5%RHA-100%Msand	10%RHA-100%Msand	15%RHA-100%Msand
28 days	6.20	7.00	7.8	4.20

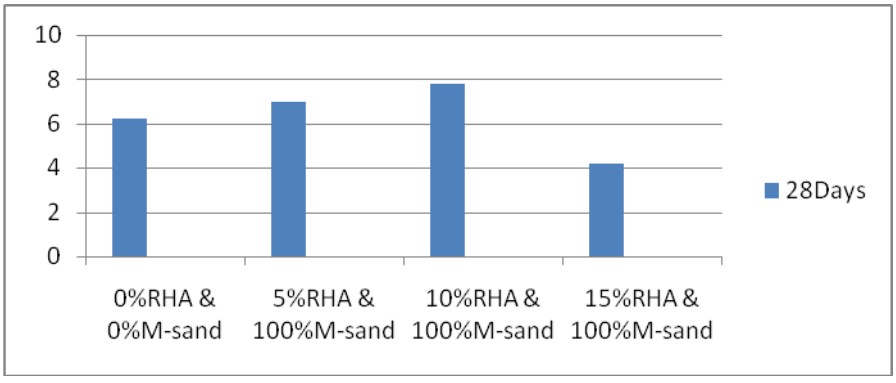

Figure No.3.3: Flexural Strength bar chart

IV. CONCLUSION

1. The slump & compaction factor value sudden decreases & vee bee seconds increases due to 100% replacement of M-sand with 0% RHA.
2. There is increase in slump & compaction factor value & decrease in vee bee seconds with increase in RHA% using 100%M-sand.
3. The results say that, the RHA in concrete has higher Compressive, flexural and split tensile strength comparing to the concrete with no RHA. It is found that the cement can be replaced with RHA up to maximum 10% with use of 100% M-sand.
4. The compressive strength for RHA mix was obtained more than mix design of conventional concrete without ash for 28-days.
5. The flexural, split tensile and compressive strength of concrete mix using 100% M-sand gives higher strength as compare to conventional concrete mix using river bank sand.
6. The experimental study shows that the addition of 15% of RHA after 28-days curing the strength obtained is very less compare to 0%, 05% & 10% RHA content.
7. Addition of RHA imparts some physical effects on concrete for more than 10% RHA content like change of colours, deterioration of concrete as well as reduction in strength.
8. The results shows that the Natural sand can be fully replaced with M-Sand & 10% of RHA can be replaced to achieve optimum strength as compare to normal conventional concrete.

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