"VARIATION OF STRENGTH OF CONCRETE BY PARTIAL REPLACEMENT OF MINERALS"

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***Abstract*:-** *Cement concrete is a most extensively used construction material the utilization of industrial waste produced by industrial process has been the focus of waste reduction research for economical, environmental and technical reasons. This research deals with partial replacement of cement with industrial waste from china clay industrial waste from china clay industries and textile industries. A partial swap of cement by industrial waste is not only cost-effective but also improves the properties of fresh and hardened concrete and enhances the durability characteristics. The level of replacement of cotton dust ash is 2 %, 4 % & 6% and that of china clay by 5 %, 10 % & 15 % by weight of cement in concrete. Test was conducted in order to determine compressive strength after 7 & 28 days curing. Further compressive strength were made between the prepared specimen and the conventional cube which was found to be satisfactory in terms of strength workability , durability & various other factors Thus the partial substitution of CD ash and china clay helps to contribute towards sustainable development in civil Engineering practices.*
Keywords: *- China clay, compressive strength, Cotton Dust Ash, Sustainable Development.*

INTRODUCTION

1.1 PREAMBLE

Concrete is one of the most commonly used construction material in the world, It is basically composed of three components i.e. Cement, sand and aggregate. Cement play a great role in the production pf concrete and is the most expensive among other ingredients making material. In addition to this there are environmental concerns in the production of cement. Due to this requirement for more economical and environmentally friendly cementing material have extended increases in partial cement replacement materials

Researchers all over the world today there are focusing on way of utilization either industrial or agricultural waste, as a source of raw material for industry. This waste utilization would not only be economical, but may also results in foreign exchange earnings and environmental pollution control Industrial waste such as blast furnace slag fly ash and silica fume are being used as additional cement replacement material.

This main advantage is,

- It is relative low cost as a finished product.
- It is mould ability to any desired shape
- High range of mould ability from zero slum roller compacted concrete to self-compacted concrete with slum flow
- The robustness it can give to a structure when require for example robustness needed against sliding
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1] CEMENT

Cement may be prescribing as a material with additive and cohesive properties which make it capable of bonding minerals fragments into a compact whole. They embrace a large variety of cementing Materials. For construction purpose the meaning of the term cement is restricted to the bonding material use with stone, sand, bricks, building blocks and etc.

2] FINE AGGREGATE

Fine aggregate are two types as natural aggregate and artificial aggregate. Natural aggregate are further classified as crushed stone fine aggregate or naturally obtain fine aggregate. In this experimental project we use natural fine aggregate that is sand which is obtained from river .as per IS Aggregate Passing No.4(4.75mm) sieve and predominantly retained on the No.200(75micron) sieve known as fine aggregate

3] COARSE AGGREGATE

Aggregate are inert granular materials such as sand, gravel or crushed stone that are end product there in own right. They are also their raw material that are an essential ingredient in concrete for a good concrete mix, aggregate need to be clean hard, strong particles free of absorbed chemicals or coating of clay and other fine material that could cause the deterioration of concrete, aggregate which account for 60 to 70% of the total volume of concrete, are divided into several distinct categories, and are either coarse and fine. Coarse aggregate are particles greater than 4.75 mm but generally range between 9.5 mm ton 37.5mm in diameter

A] COTTON DUST ASH

Cotton dust (CD) originates from turning material industry contains significant measures of cellulose, it very well may be utilized as an elective optional material for the creation of cement. This examination was performed by supplanting cementitious material with burned CD. New and solidified cotton dust slag concrete was contrasted with a reference arrangement. The dimension of substitution was at 0%, 5%, 10%, 15%, and 20% by weight. Watched results demonstrated that CD slag concrete had reliably prompted enhancement in quality execution. It was discovered that residue of cotton ash measurement at 10% by weight gave a definitive compressive, flexural, and part rigidity of 32.92, 8.36, and 4.84 N/mm2, individually. Its fiery debris utilized in this investigation was a waste material of CD which came about of the mechanical preparing of crude cotton in the turning procedure. The CD was burned in heater at 800°C.In Thailand, add up to cotton fibre generation is evaluated to be 351,000 tons for every year, of which roughly 240 tones cotton dust (CD), considered as small scale dust and non-saleable waste, is delivered amid yarn producing forms (Singhadeja, 2011) .

B] CHINA CLAY

Meta kaolin is a pozzolonic added substance or item which can give numerous explicit features. Meta kaolin is profitable admixture for cement and concrete application. For starter examination, the physical and compound property of Meta kaolin and bond are comparable. The pozzolonic response of Meta kaolin begins between 7 to 28 days. China earth (Kaolin) squander is an item after filtration of china mud from their mineral which is one of the significant waste materials. Regular crude materials are ending up rare, while around the globe, a large number of huge amounts of inorganic squanders are delivered each day in mining, mineral preparing and mechanical exercises, whose transfer is liable to ever stricter ecological enactment.

MATERIAL AND METHOD

1. Cement: Portland cement of grade 53 confining IS: 8112-1989 was used

2. Aggregate:- Locally available river sand confining to IS: 383:1970 was used fine aggregate passing through 20mm

3. Water: - portable water was used for mixing and curing.

4. Casting and curing were performed as per IS: 516:1959

The characteristics of material is represented as table no 1

DESIGN MIX

The test sample which was used of M20 the mix was design as per Indian STD Method (IS 10262: 2009). The sample prepared of the mix design proportion is represented as table on the design proportion of concrete type is shown as table no

EXPERIMENTAL METHODOLOGY

The process consists of china clay & cotton dust ash was partial replaced by cements. This method was further proceed and the experiment was test in different % china clay 5% ,10% , 15% and 2% , 4% , 6%

Of cotton dust ash. The mould cubes were prepared and casted of the size (150mm x 150mm x 150mm) for each 1:1.42:3.09:0.5 concrete mixed with partial replacement of cement. Further the curing of the mould was proceeding and the specimen was tested as per 7 & 28 days respectively for its compressive strength. The method which was used for curing the mould was pond curing.

EXPERIMENTAL RESULTS

The compressive strength of the mould was tested on the compression testing machine.

All the samples which were casted were tested. The studies of the mould were casted and compare of the mix design having 1:1.42:3.09:0.5 with partial replacement of cement i.e. china clay and cotton dust. The overall result of compressive strength is represented as table no 4

CHARACTERISTICS OF MATERIALS

TABLE NO 1

SR.NO	Materials	Properties	Test result
1.	Cement	Specific gravity	3.15
		Fineness Modulus	3.08%
		consistency	22%
		Initial & final setting time	30min & 600 min resp.
		Soundness	2mm
2.	Fine Aggregate	Specific Gravity	2.60
		Finess modulus	3.48%
3.	Coarse Aggregate	Specific gravity	2.6
		Impact value	7.45%
		Fineness modulus	9.38%
4.	Cotton Dust Ash	Specific gravity	2.2

DESIGN MIX PROPORTION FOR M20 MIX

TABLE NO 2

	Cement	Fine aggregate	Coarse aggregate	Water
By weight	383 kg/m3	546 kg/m3	1187 kg/m3	191.61
ratio	1	1.42	3.09	0.5

5	Metakolin	Specific gravity	2.6

DESIGN MIX PROPORTION FOR VARIOUS CONCRETE

TABLE NO 3

Sr no	CONCRETE Type	Material
1	CC1	5% replacement of China clay
2	CC2	10% replacement of China clay
3	CC3	15% replacement of China clay
4	CD1	2% replacement of Cotton Dust Ash
5	CD2	4% replacement of Cotton Dust Ash
6	CD3	6% replacement of Cotton Dust Ash

STRENGTH OF COCNRETE WITH PERCENTAGE OF CHINA CLAY AND COTTON DUST ASH

TABLE NO 4

COMP[illegible]ENGTH (N/mm2)								
CONVENTIONAL CUBE		COTTON DUST ASH			CHINA CLAY			
7 days	28 days	%	7 days	28 days	%	7 days	28 days	
		2	14.44	20	5	13.7	22	
13.3	18.7	4	15.2	21.5	10	15	23.5	
		6	15.5	18	15	10	15	

OVERALL COMPARISSION

Fig 1 comparision between china clay and convention cube

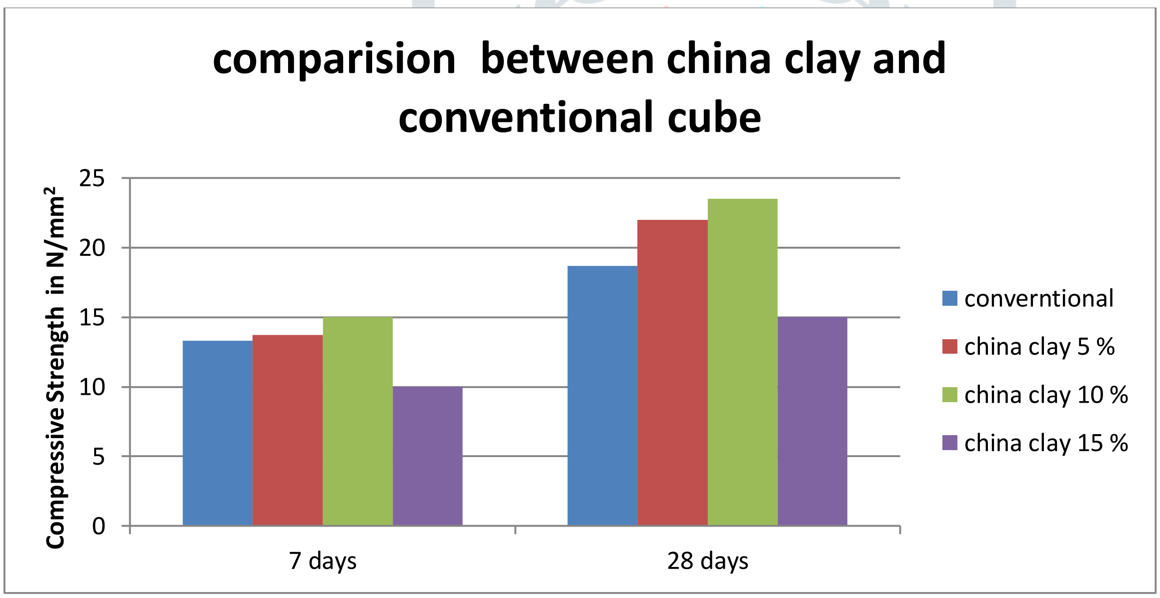
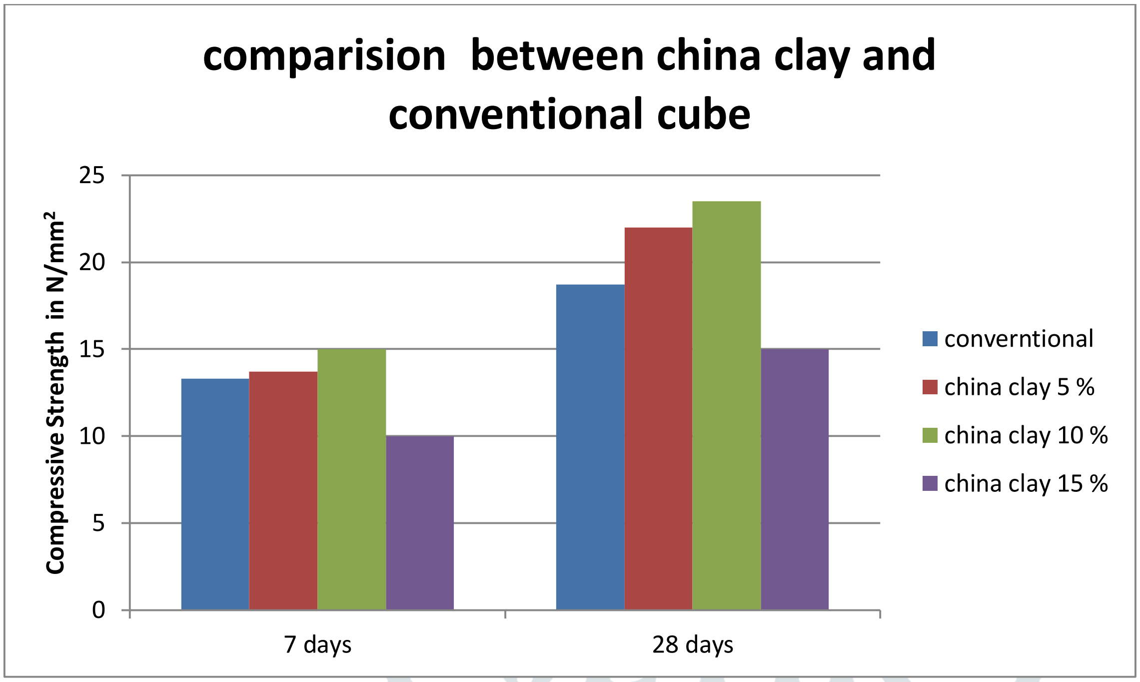


Fig 2 Comparison between cotton dust and conventional cube



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CONCLUSION

The Experimental result are as follows :

1. On replacement of cement with china clay it provides maximum compressive strength at 10% and on increasing percentage the strength reduces.
2. The maximum compressive strength of china clay after 28 days curing was 23.5 N/mm2
3. On replacement of cement with cotton dust ash initially increases
4. The maximum compressive strength of Cotton Dust Ash after 28 days curing was 21.5 N/mm2

REFERENCES

1. Author: RafatSiddiquea, JuvasKlausb
Publication: Volume 43, Issues 3–4, March 2009
"Influence of met kaolin on the properties of mortar and concrete"
2. Author: Borvorn Israngkura Na Ayudhya
Publication:- Songklanakarin J. Sci. Technol. 37 (2), 201-207, Mar. - Apr. 2015
"Cotton dust ash from spinning textile industry as a secondary material in concrete"

REFERENCE CODE FOR PRACTICE

1.IS: 456-2000 Plain and Reinforced concrete code of practice.
2.IS :10262-1982 recommended guidelines for concrete mix design.
3.IS :10262-2009 recommended guideline for concrete.
4. IS:383-1970 Indian standard specification for coarse and fine aggregate.
5. IS:516-1059 methods of testing for strength of concrete.