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Experimental Study of Mechanical Properties of Sintered Fly Ash Aggregate in Concrete

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ABSTRACT

This paper gives the work carried out for the enhancement of mechanical residences of sintered homes fly ash mixture in concrete. Fiber Reinforced Concrete is a composite fabric consisting of a matrix containing a random distribution or dispersion of small fibers, having a excessive tensile strength. Alkali resistant glass fiber prevents corrosion and helps enhance concrete properties. Like make bigger tensile strength, enhance resistance to impact, amplify shear strength, higher water resisting properties. Glass fibers weight is lots lighter than when metal is used in concrete. Good freeze-thaw resistance helps shield various climatic stipulations at marine environments in very bloodless international locations In this study, Conventional concrete has the trait regarded as "brittle failure" due to the fact it has a semi- crystalline structure, which tends to shatter on impact. This is mainly risky when subjected to explosive pressure due to the fact ballistic particles is created which can create giant collateral damage. This is no longer the case with GRFC, as it does no longer ride brittle failure. it is determined to scan locate out the power and sturdiness of the Glass Fiber Reinforced Concrete made the usage of Cement for assessing its suitability for Marine and Hydraulic Constructions.

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1. INTRODUCTION

Fiber Reinforced Concrete is a composite fabric consisting of a matrix containing a random distribution or dispersion of small fibres, having a excessive tensile strength. Due to the presence of these uniformly dispersed fibres, the cracking energy of concrete is accelerated and the fibres performing as crack arresters. Fibers when introduced in positive proportion in the concrete enhance the pressure homes nicely as crack resistance, ductility, as flexure electricity and toughness. Alkali resistant glass fibre prevents corrosion and helps enhance concrete properties. Like enlarge tensile strength, enhance resistance to impact, and expand shear strength, higher water resisting properties.

Glass fibers weight is a great deal lighter than when metal is used in concrete. Good freeze-thaw resistance helps guard various climatic stipulations at marine environments in very bloodless countries. Conventional concrete has the trait acknowledged as "brittle failure" due to the fact it has a semi-crystalline structure, which tends to shatter on impact. This is specifically unsafe when subjected to explosive pressure due to the fact ballistic particles is created which can create substantial collateral damage. This is no longer the case with GRFC, as it does now not trip brittle failure.

The glass fiber tends to preserve the fabric collectively due to the fact the fibers are dispersed randomly and lay in all instructions inside the fabric matrix. GFRC has a dramatically decreased ballistic particles profile. In this find out about, it is determined to scan discover out the power and sturdiness of the Glass Fiber Reinforced Concrete made the usage of Cement for assessing its suitability for Marine and Hydraulic Constructions.

1.1 OBJECTIVES

- To learn about the residences of glass fiber.
- To learn about the harden homes of concrete, in which the glass fibers are introduced in exceptional percentage to whole weight of cement (0%,0.2%,0.4%) and 4% of glass fiber is used continuously in all combine of concrete, then the following take a look at are to be conducted.

- Compressive Strength of concrete
- Split tensile take a look at of concrete.

2. METHODOLOGY

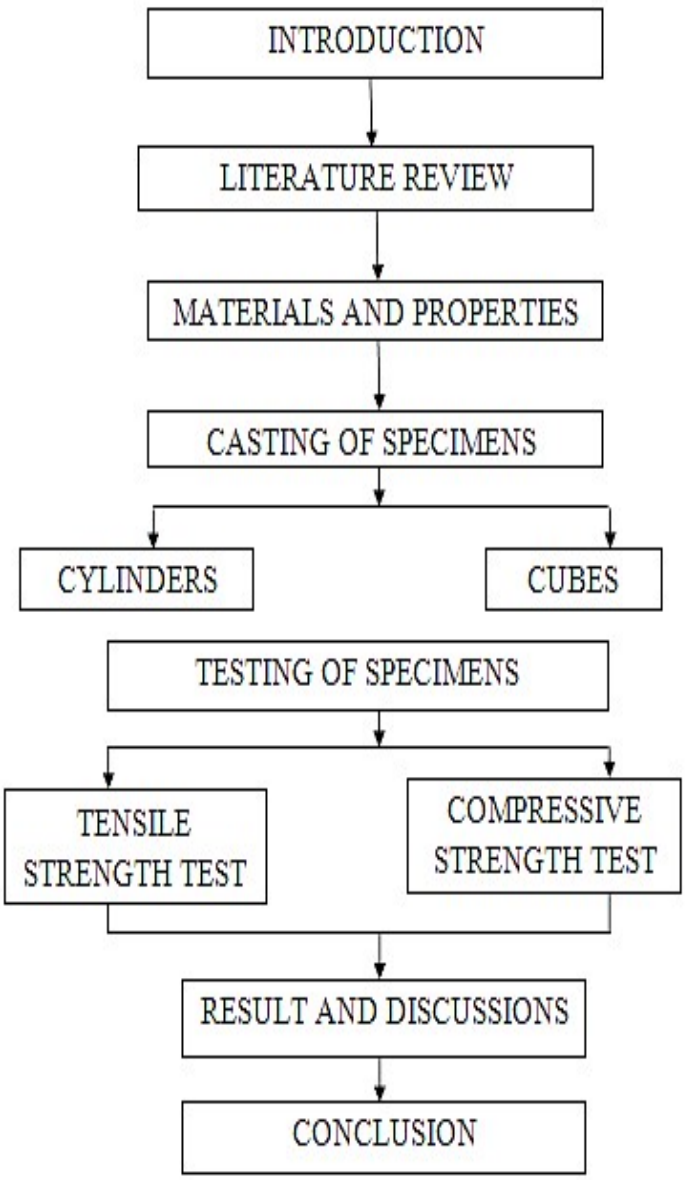

Fig 2.1 Methodology Chart

3. MATERIALS AND PROPERTIES

3.1 PHYSICAL PROPERTIES OF CEMENT

Sl. No	Properties	Test Results	As Per IS Code
1	Specific gravity	2.9	3.10-3.20
2	Normal consistency	32%	25-35%
3	Initial setting time Final setting time	20 mints 203 mints	>30 minutes should not
4	Fineness test by sieve analysis	1.9	<10%
5	Soundness test	1mm	1

Table 3.1 Physical Properties of Cement

3.2 CHEMICAL PROPERTIES OF CEMENT

Oxide Name	Chemical Formula	Percent Content Range
Lime	Cao	62
Silica	Sio2	22
Alumina	Al2o3	5
Iron oxide	Fe2o3	3
Magnesium oxide	Mgo	1
Sulphur trioxide	So3	1
Alkalis	K2o, Na2o	1

Table 3.2 Chemical Properties of Cement

Fig.3.1 Cement

3.3 PHYSICAL PROPERTIES OF FINE AGGREGATE

S.N	Properties	Test Result
1	Specific gravity	2.64
2	Water absorption	1%
3	Fineness modules	2.548
4	Sieve analysis	Conforming to zone II

Table 3.3 physical properties of fine aggregate

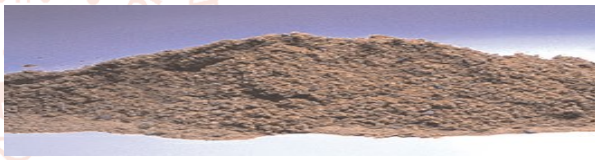

Fig.3.2 Fine aggregate

3.4 PROPERTIES OF GLASS FIBRE

Physical Properties	Value
Length	12mm
Aspect ratio(l/d)	58
Specific gravity	2.68
Softening point	3.6%
Moisture	0.3% max
Electrical conductivity	Very low
Chemical resistance	Very high
Tensile strength	700 Mpa

Table 3.4 Properties of Glass Fiber

4. EXPERIMENTAL WORKS

This lookup works provides the effects of an experimental learn about on energy of excessive overall performance concrete the usage of glass fiber. Initially the houses of cement and glass fibers have been studied and in contrast with herbal coarse

mixture and satisfactory combination for its suitability. IS 10262-2009 combine format for M35 grade of concrete used to be finished and it used to be arrived as 1: 1.6: 2.907. Here for the glass fiber delivered at the proportion of 0%, 0.2%, 0.4% in that combine ratio. Using this mix, the well-known specimens have been solid to confirm mechanical properties. To locate the compression test, spilt tensile take a look at of the specimens.

4.1 MIXING OF CONCRETE

Design of concrete combine wishes no longer solely the know-how of cloth residences and homes of concrete in plastic condition, it additionally wants wider information and trip of concreting. Even then the share of the substances of concrete determined out at the laboratory requires amendment and readjustments to swimsuit the area conditions.

Fig.4.1 Cement, Fine aggregate and Coarse aggregate

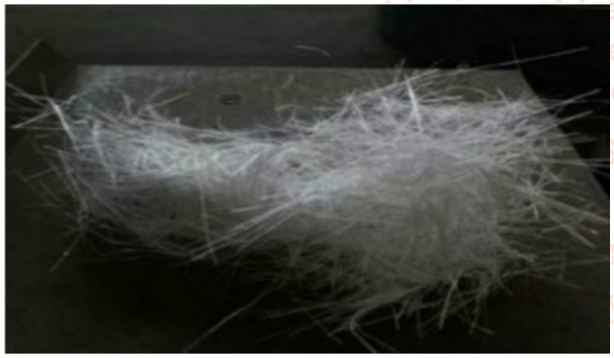

Fig.4.2 Glass fiber

4.2 CASTING AND CURING OF SPECIMENS

The specimens are solid by using the usage of required dimension of moulds. The concrete is positioned with the aid of the three layers for applicable compaction. After casting, specimens are left for 24 hours for putting and then it is remolded. Identification marks are made on face of the specimen and it is immersed in curing tank.

Concrete was once organized with the aid of a combine proportion of M35 grade concrete. The special share of fibers like 0, 0.2, 0.4 had been adopted in the experimental programmed. Glass fibers have been introduced in the combine with the aid of extent of concrete. The complete combine used to be homogeneously blended with calculated quantity of water and plasticizer. The compressive power check specimens have been of dimensions one hundred × a hundred × 100mm.The break up tensile power take a look at specimens have been of dimensions 150mm diameter × 300mm length. These specimens had been solid and examined after 7 days and 28 days of curing as per IS specification.

Fig 4.3 Casting and Curing of Specimens

4.3 DETAILS OF TEST SPECIMENS

S. No	Specimen	Glass Fiber As %	No of Specimen		Total
			7 D	28D	
1	CUBE (100mm x 100mm x 100mm)	0	3	3	18
		0.2	3	3	
		0.4	3	3	
2	CYLINDER (150mm x 300mm)	0	3	3	18
		0.2	3	3	
		0.4	3	3	

Table 4.1 Details of Test Specimens

5. RESULTS AND DISCUSION

5.1 COMPRESSIVE STRENGTH TEST RESULT

Sl.No	%of Fibers	Compressive Strength(N/mm^2)	
		M35 Concrete	
		7 D	28D
1	0	45.05	50.33
2	0.2	50.11	52.10
3	0.4	55.85	59.69

Table.5.1 Compressive Strength of M35

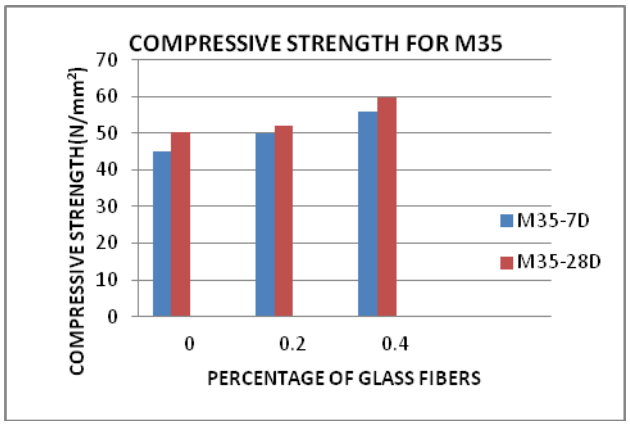

Fig 5.1 Compressive Strength Test Graph

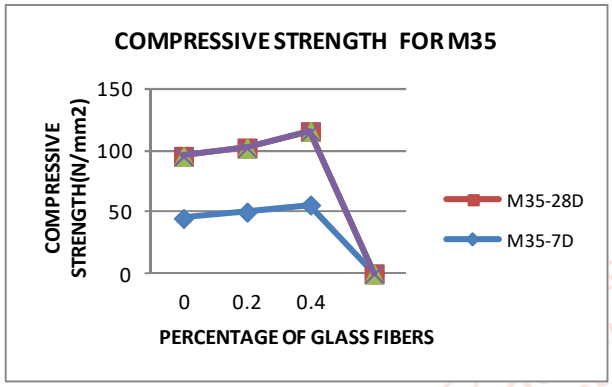

Fig 5.2 Compressive Strength Test of Line Graph

5.2 SPLIT-TENSILE STRENGTH TEST RESULTS

Sl. No	%of Fibers	Split Tensile Strength(N/mm²)	
		7 D	28D
1	0	2.54	3.08
2	0.2	2.94	3.37
3	0.4	3.05	3.38

Table.5.2 Split Tensile Strength of M35

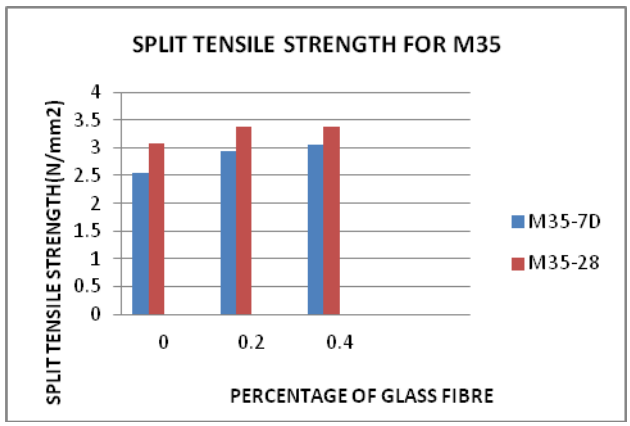

Fig 5.3 Split Tensile Strength Test Graph

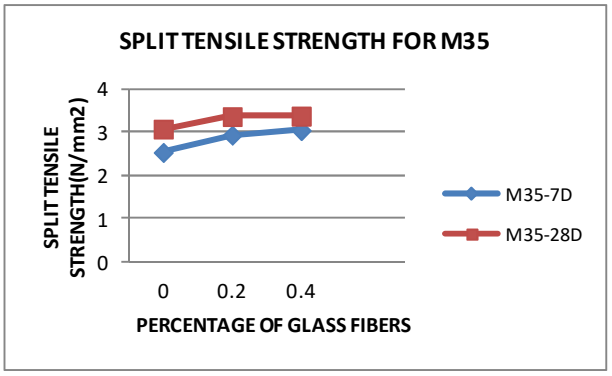

Fig 5.4 Split Tensile Strength Test Line Graph

6. CONCLUSION

In this study, it is concluded that the range of Glass Fibre Concrete made an remarkable preference for marine and hydraulic shape constructions, as compressive electricity and tensile electricity will increase with make bigger in share of glass fibre with admire to extent of concrete. Also since, the deterioration observed for chloride resistance is observed to be very less.

As this composite will increase tensile energy it may additionally decrease the region of metal reinforcement required, minimizing the deterioration in marine environments and hydraulic structures. If any due to corrosion of metal reinforcements.

As tensile and compressive electricity will increase with enlarge in share of glass fiber with appreciate to extent of concrete, marine and hydraulic structural factors can be supplied with greater concrete cowl supported by way of glass fiber, which makes it difficult for factors that motive deterioration to attain the floor of metal reinforcements, stopping corrosion and growing the existence of concrete in these environments.

REFERENCES

[1] Deshmukh S.H. , Bursary J. P , Zende A. M. (2012), "Effect of Glass Fibres on Ordinary Portland cement Concrete" IOSR, Journal Of Engineering, June 2012, Vol. 2(6) pp: 1308-1312.

[2] Neel Shah, Dr.Indrajit, N.Patel (2013) "Tensile Strength of High Performance Concrete Using Supplementary Cementing Material and Glass Fiber",Indian Journal of Applied Research, July 2013 ,Volume 3, Issue 7, pp 257-259.

[3] Philipp Lober, Klaus Holschemacher, "Structural Glass Fiber Reinforced Concrete for Slabs on Ground", World Journal of Engineering and Technology, 2014, 2, 48-54.

[4] Rama Mohan Rao.P, Sudarsana Rao.H, Sekar.S, "Effect of Glass Fibres fly ash based Concrete", International Journal Of Civil And Structural Engineering, Volume 1, No 3, 2010, pp 606-612.

[5] "Strength and Workability Characteristics of Fly Ash Based Glass Reinforced High Performance-Concrete"(2008) by Dr.H.SudarsanaRao, International Journal of Engineering Science and Technology (IJEST), Vol.3 No. 8 August 2011, pp 6266-6277.

[6] P.Bhuvaneshwari, (2013) "Strength characteristics of glass fiber on bottom ash based concrete", International Journal of Science, Environment and Technology, Vol.2, No 1, 2013, 90 – 102.

[7] M. Sosa1, T. Pérez-López1, J. Reyes, F. Corvo, R.Camacho-Chab, P. Quintana, D. Aguilar J. Electrochem Sci.,"Influence of the Marine Environment on Reinforced Concrete Degradation Depending on Exposure Conditions", (2011).

[8] Dr.P.Srinivasa Rao, Chandra Mouli , &Dr. T. Seshadri sekhar, "Durability Studies on Glass Fibre Reinforced Concrete" Journal of Civil Engineering Science, An International Journal Vol. 1 No. 1-2 (January-December, 2012).

[9] "Effect of acidic environments on cement concrete Degradation" by Joanna Julia Sokołowska, Piotr Woyciechowski of Warsaw University of Technology, DMBE, Poland.