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STRENGTH OF CONCRETE CHOPPED GLASS FIBERS TILES AND EFFECTS OF GLASS FIBERS

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Abstract - In this project we use the M-20 grade concrete designed as per IS 10262. finding the effects of the flexural strength, tensile strength and also the compressive strength. The aggregates which is used in this design was 20mm in size.

To study of compressive strength, flexural strength and tensile strength we cast the 6 cubes, 6 prism and 6 cylinders and tested it after the application of GFRC in the form of cement concrete tiles and in this process no special techniques was used for casting of tiles. The tiles thickness was 20mm and aggregate maximum size was 8mm. The water cement ratio was consistent and the some admixture content was varied from 8-1.5% to maintain slump in between 50mm-100mm.

The mix proportion was 1:1.78:2.66. the short fibers size were 30mm and the glass fibers were alkali resistant.

We carried out the effect of this short fiber on the compressive strength and also on water absorption. We cast six full size tiles 400mm*400mm*20mm and tested and result recorded.

1.INTRODUCTION

1.1 General

Concrete is the one of the most important building and the use of this material is increasing day by day in the entire world. The main reason of its most using is that it is cheap and easily availability. How ever it has some disadvantages just like brittleness and the poor resistance to crack opening. It have very low tensile strength and it also brittle material so therefore fibers are used for increasing tensile strength and for decreasing the brittleness. Till now variors experiments are have been done on fresh concrete as same as on hard concrete. But the basic material remains same and superplasticizers, admixture, are used for the increase and decrease the setting time and getting the workability and higher compressive strength.

Fibres which are applied for structural concretes are classified according to their material

As Steel fibres, Alkali resistant Glass fibres (AR), Synthetic fibres, Carbon, pitch and polyacrylonitrile (PAN) fibres.

1.2 Glass Fibre Reinforced Concrete

The Glass fiber reinforced concrete (GFRC) is a cement composite reinforced product with glass fibers of different length and size. This fiber glass is used alkaline resistant. GFRC. Glass strands are utilized for the most part for outside claddings, veneer plates and different components where their reinforcing impacts are required during construction. GFRC has lower slump in fresh state so it have less workability thats why we use water reducing admixtures. Other properties of GFRC is depend upon the producing methodsof product. There are various methods of producing it like spraying, casting, extrusion techniques etc. The type of cement is also affect the GFRC also fibers length, sand type, cement ratio and curing duration affect the properties of GFRC.

1.3 Applications

- The main area of FRC applications are as follows
- Runway, Aircraft Parking and Pavements
- Tunnel lining and slope stabilization
- Blast Resistant structures
- Thin Shell, Walls, Pipes, and Manholes
- Dams and Hydraulic Structure

Different Applications include machine tool and instrument frames, lighting poles, water and oil tanks and concrete repairs.

1.4 Present Investigation

The main purpose of the research is to findout the tensile strength, compressive strngth and flexural strength and other properties of GFRC.This study carried out on M20 grade concrete with 30mm size of glass fibers and content of fiber is varied from 0% - 0.3% of total weight of concrete. For study of this three properties no admixture was used.

The glass fiber effect on concrete tiles was studied that fiber content varied 0% - 0.7% of total weight of concrete. This tiles are used at various places because its heavy duty tiles aand also use for practical purpose.

2.1 LITERATURE REVIEW

Concrete which is one among the foremost important construction material and is brittle in nature with excellent compressive strength but weak in tension and flexure as a result concept of fibre ferroconcrete has developed. The term

fibre-reinforced concrete (FRC) is defined by AC1 116R, Cement and Concrete Terminology, as concrete containing dispersed randomly oriented fibres. With time tons of fibres are utilized in order to enhance the properties of concrete and even waste materials like ash , silica fumes have also been used.

Use of fibres during a brittle isn't a replacement concept, the Egyptians used animal hairs, straw to strengthen mud bricks and walls in houses, around 1500 B.C. (Balaguru et al, 1992). Ronald F. Zollo presented a report on fibre ferroconcrete during which he had mentioned about 30 years of development and research during this filed. within the report it's claimed that the work on FRC started around 1960.Since than tons of labor has been done on FRC using different methods of production also as differing types of fibre, size of fibre, orientation and distribution.

American Concrete Institute (ACI) Committee 544 divided FRC broadly into four categories supported fibre material type. SFRC, steel fibre FRC; GFRC, optical fiber FRC; SNFRC, synthetic fibre FRC including carbon fibres; and NFRC, for natural fiber FRC. the thought of fiber support has been produced in current times and weak cement based brittle matrix was strengthened with asbestos filaments when in around 1900 the alleged Hatschek innovation was created for creation of plates for material, funnels, then forth. Later, glass fibres were proposed for fortification of concrete glue and mortar by Biryukovichs.

Fibre-reinforced polymer (FRP) bars are often wont to replace steel reinforcement conventional steel has the inherent problem of corrosion as a results of which it undergoes expansion and concrete cracking may occur; therefore FRP rebar could also be used as an alternate. the utilization of this fibres excludes the matter of corrosion and increases the ductility of the FRP-reinforced concrete beams but the load deflection was found to be higher.(Mohamed S. Issa, Ibrahim M.Metwally, Sherif M. Elzeiny 2010)

Inorganic Fibers:

Kenneth W. Stier and Gary D. Weede (1999) investigated the feasibility of recycling commingled plastics Fibre in Concrete.It was found that the mechanical properties of concrete such as compressive and flexural strength showed improvement but however the sturdiness aspect was questionable. Sekar (2004) studied on fibre ferroconcrete from industrial lathe waste and wire winding waste and located that this waste significantly improved the compressive, split-tensile strength and therefore the flexural strength values of concrete. It also stated that wire drawing industry waste decreased the strength values. Effect of re-engineered plastic shred fibre were studied by Anbuvelan et al (2007).

Natural Fibres:

Natural fibres were traditionally utilized in the past as reinforcing materials and their use thus far has been traditional much more than technical. they need served useful purposes but the application of natural fiber as a reinforcing material for concrete may be a new concept. Improved tensile and bending strength, , greater resistance to cracking and hence improved impact strength and toughness ,greater ductility are a number of the properties of natural fiber reinforced concrete.

Fiber

Fibre may be a natural or synthetic string or used as a component of composite materials, or, when matted into sheets, wont to make products like paper, papyrus, or felt. Concrete is brittle by nature and is weak in flexure also as direct tension therefore so as to enhance this properties fibres are added to concrete. Fibres could also be short discrete or in sorts of rods or may be even in sort of textile fibres or woven mesh fibres. Various sorts of fibres are added to concrete some have high modulus of elasticity some have low modulus of elasticity each category can improve certain properties of concrete. In our case short discrete glass fibres were used and as optical fiber is vulnerable to alkali we used alkali resistant glass fibres. A fiber may be a material made into an extended filament with a diameter generally within the order of 10 tm. the most functions of the fibers are to hold the load and supply stiffness, strength, thermal stability, and other structural properties within the FRC.

Glass strands are filaments generally utilized as a neighborhood of the maritime and mechanical fields to create composites of medium-elite. Their unconventional trademark is their top quality . Glass is basically made from silicon (SiO_2) with a tetrahedral structure (SiO_4). Some aluminum oxides and other metallic particles are then included different extents to either facilitate the working operations or change a couple of properties (e.g., S-glass strands show a better elasticity than E-glass).

The era development of fiberglass is fundamentally in light of turning a bunch made from sand, alumina, and limestone. The constituents are dry mixed and passed on to melting (around 1260°C) during a tank. The liquefied glass is conveyed straightforwardly on platinum bushings and, by gravity, goes through specially appointed openings situated on the bottom . The fibers are then gathered to shape a strand ordinarily made from 204 fibers. the only fiber features a normal measurement of 10 μm and is often secured with a measuring.

To upgrade the bond within the middle of filaments and grid, and to secure the strands itself against soluble operators and dampness, strands experience estimating medicines going about as coupling specialists. Such medicines are helpful to enhance toughness and weakness execution (static and element) of the composite material. FRP composites taking under consideration fiberglass are normally meant as GFRP.

3. MATERIALS AND METHODS

3.1 Materials

1. Concrete
2. Cement

2.1 Coarse Aggregates

2.2 Fine Aggregates

3. Water

4. Fiber

5. Admixture

3.2 Methods

1. Casting of Tiles

2. Form Work

3. Mixing of Concrete

4. Compaction

5. Curing of Concrete

4. EXPERIMENTAL SETUP

Various tests conducted on the specimens are described below

There were two ways in which the all tests was carried out one in which only cubes, cylinders and prisms were constructed and the grade of concrete was M-20 .The nominal maximum size of aggregate was 20mm and no admixture was used in this.

1 Compressive strength

2 Split Tensile Strength

3 Flexural Strength

4 Tests carried out on Cement and Concrete Tiles

5 Water absorption test

6 Wet Transverse Strength Test

7 Compressive Strength

5. RESULT

The result will be come after the 28 days of curing. We taking the all experimental data and after 28 days calculate the all the test data.

6. CONCLUSION

Also conclusion is come after the all calculation and it is shown with the help of graphs and tables.

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