STUDY OF FIBER REINFORCED CONCRETE BEAMS CONTAINING GLASS FIBERS AT DIFFERENT DEPTHS

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Abstract- *In present study, the experimental work is finished by finding the optimum share of the glass fibers furthermore, by testing the specimens for compressive, split durability and flexural strength by considering the varying percentages of fiber content throughout the beam viz.0%, 2%, 4%, 6%and 8%. And neutral axis below varied percentages viz. 0%, 2%, 4%, 6% and 8 scrutinies the mechanical properties with the traditional concrete, here the traditional concrete is intended for M30 grade. when finding the optimum content of fiber the load-deflection studies were carried on the* concrete *beams of standard concrete glass fiber additional concrete and examined the variation of most deflection worth, load initially crack, final load with the half of fiber content from the results the conclusions were created.*

Keywords-- split tensile strength, neutral axis, deflection, glass fibre

I.INTRODUCTION

The homogenous mixture of Cement, fine aggregate, Coarse aggregate, and water is called concrete.Concrete is a composite material made of coarse aggregate bonded together with a cement paste that hardens progressively with time. Since the fundamental properties of the concrete are bond and it generally depends on the lime composition and with which are types of cement made by lime. When aggregate, Portland cement, and water combined (mixed) a slurry form and it is effortlessly (easily) transformable and can be formed into wanted (desired) shapes. What's more, there are a few admixtures and pozzolanic materials and super plasticizers can impart some new physical properties or can enhance (improve) the physical properties of concrete. Steel bars have been utilized as a powerful and cost-efficient reinforcing material for concrete.

Glass fiber reinforced concrete (GFRC) is a type of concrete the glass fibers of concrete dispersed in a matrix consists of a cementituous mixture composed of cement, sand, coarse aggregate, water, and admixtures. Glass fiber reinforced concrete (GFRC) is civil engineering recent introduction. So, it's been extensively utilized in several countries since its introduction 20 years agone. Glass-fiber-reinforced concrete contains concrete mixture with high-strength, alkali-resistant glass fiber. In this peculiar form, both fibers and matrix keep their physical and chemical properties as it is, it is offering synergic properties it is not achieved either of these components either acting alone for in the concrete. In general, fibers area unit the main load-carrying members, whereas the encompassing matrix tries to stay them within the desired locations and orientation, acting as a load transfer medium between the fibers and protects them from environmental damages. The fibers provide reinforcement for the matrix and other useful functions like limiting crack formation and improved ductility in fiber-reinforced composite materials. Glass fibers can be incorporated into a mixture either in continuous or discontinuous lengths. Durability was poor with the first sort of glass fiber because of the fact that the alkalinity of bond reacts with its silica.

II.LITERATURE REVIEW

G. JyothiKumari, et al(2014) was studied the behaviour of concrete beams contains optical fiber bolstered chemical compound flats and beams with silica-coated optical fiber bolstered chemical compound (GFRP) flats shear reinforcement will show higher failure masses they determined malleability property improvement was higher once flats as shear reinforcement. The strength of the flats, bars, composites, flats or bars depends upon the orientation of fiber and fiber to matrix quantitative relation. Dr.P.SrinivasaRao, et al(1998) conducted experiments on sturdiness in glass fiber concrete. The studies were dispensed to search out the workability of concrete, concrete resistance against acids, sulphate and speedy chloride permeableness take a look at of M30, M40 and M50 grade of optical fiber concrete and standard concrete. They notice that sturdiness exaggerated by adding alkali immune to the glass fibers to the concrete matrix. S. H. Alsayed, et al (2004) studied the performances of optical fiber bolstered plastic bars victimization as a reinforcing material for concrete structures. a brand new technique referred to as Review on the performance of glass fiber concrete the last word style theory is employed to estimate correct results of flexural load carrying capability of concrete beams strengthened by GFRP bars.it holds regarding the low modules snap of GFRP bars. Performance of G.F.R.C studies was applied by Yogesh Murthy, et al (2001). The study tells this the optical fiber usage in concrete improves not solely the properties of concrete and a cheap cutting however it conjointly provides the glass as environmental waste simple disposal from the trade. From the study, it will be discovered that it shows

half-hour strength increase by the flexural strength of the beam with one.5% glass fiber. the rise in optical fiber content Shows that the reduction slump is ascertained. Romualdi and Batson (1994) revealed their classical paper on 'Mechanics of crack arrest in concrete'. They over that the applying of linear elastic fracture mechanics to ferroconcrete indicates that the comparatively low lastingness of concrete isn't inherent to the fabric and may be avoided with appropriate reinforcement arrangement. At acceptable spacing, early flaws are prevented from enlarging and propagating throughout the tensile zone. In their different analysis (1963) it absolutely was over sixteen that the primary crack strength of concrete improves by combining closely spaced continuous steel fibers in it.

III. MATERIALS

A .Cement:

In nowadays, round the world cement is employed a basic and most vital ingredient of the concrete, mortar, stucco, and most non-specialty grout. It developed from alternative kinds of hydraulic lime in England within the mid-19th century it originates from sedimentary rock. it's made by the heating the materials during a oven to create a standard cement what's clinker, grinding the clinker and adding little amounts of alternative materials. Many varieties of cements square measure out there and principally we have a tendency to square measure victimization grey color Portland cement.

B. Sand:

Sand is a naturally occurring granular material composed of finely divided rock and mineral particles. The most common constituent of sand is silica (silicon dioxide, or SiO_2), usually in the form of quartz which, because of its chemical inertness and considerable hardness, it is the most common mineral resistant to weathering. It is used as fine aggregate in concrete.

C. Coarse aggregate:

Two single sized crushed stone aggregates ranging from 12.5mm to 16mm were used in respective proportions in concrete mixes. The aggregates were tested in accordance to IS-383: (1970).The results obtained are tabulated.

D. Water:

Water plays a major role in the strength of concrete. it needs 3/10th of its weight of water for the complete association. Scientists found that standard concrete needs the minimum water cement magnitude relation regarding 0.35. Water places a significant role in reacting with a chemical with a fine and course combination of the cement.

E. Glass fiber:

The glass fibers with the designation "Cem-Cem-Fil Anti-Crack, HD-12mm, Alkali Resistant glass fibers" were used throughout within the experimental work.

IV.METHODOLOGY

The present study is aimed at dealing the strength of the beam. The objectives of the present study are elaborated below.

A. Mix design of concrete:

Effective mixing is important for the production of uniform, high quality concrete. For this reasons methods and equipment should be capable of effectively mixing concrete materials which contains different size of both coarse aggregate and fine aggregate to produce uniform mixtures of minimum slump which is suitable most of the practical works.

B. Workability:

Workability is that the ability of a contemporary (plastic) concrete combine to fill the form/mold properly with the specified work (vibration) and while not reducing the concrete's quality.

C. Curing:

Properly curing concrete leads to increased strength and lower permeability and avoids cracking. Care must also be taken to avoid freezing, or overheating due to the exothermic setting of cement. Improper curing can cause scaling, reduced strength, poor abrasion resistance and cracking.

D. Load and deflection comparative strength studies of a beam:

Preliminary tests for combine style of concrete need to conduct on cement, sand, and aggregates and also the concrete combine style needs to be in deep trouble the M30 grade concrete. Casting the cubes of size 150mmx150mmx150mmand testing for compressive strength for various percentages of optical fiber content viz. 0%, 2%,4%,6% and eight once twenty eight days of natural process. Casting the cylinders of the height of 30cm and 15cm in diameter. And testing for the split lastingness for various

percentages of the optical fiber content viz. 0%,2%,4%,6%, and eight once twenty eight days natural process. Casting the beams of size 100mmx100mmx1000mm with totally different percentages of the optical fiber viz. 0%,2%,4%,6% and 8%.the casting of one beam with zero you look after the optical fiber. Casting of four beams with various factors of optical fiber below the neutral axis. Casting of four beams with various factors of optical fiber up to full depth of the beam. Perceptive the impact of an optical fiber in numerous aspects on the concrete properties.

TABLE 1

Mix proportion

Water	Cement	Fine aggregate	Coarse aggregate
186 lit	442.85kg	561.65kg	1022.58 kg
0.42	1	1.26	2.31

V. RESULTS

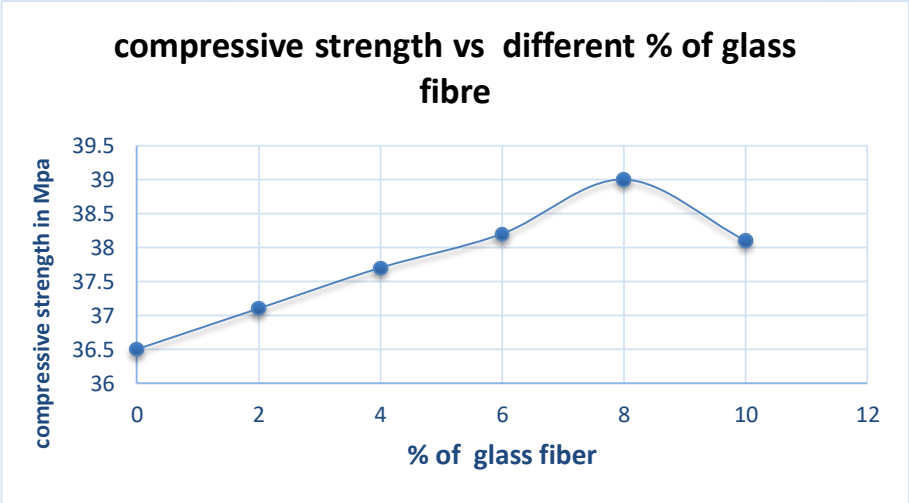

fig:1 variation of compressive strength expectantly of glass fibres used

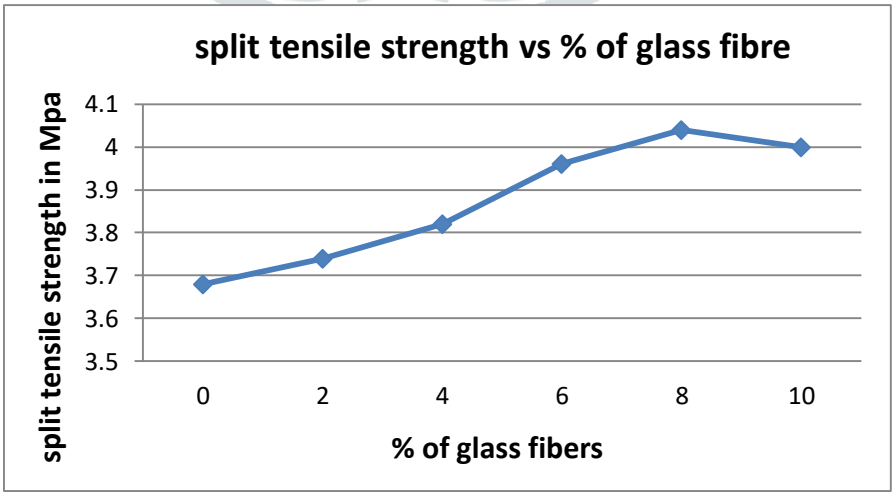

Fig 2: variation of compressive strength expectantly of glass fibres used

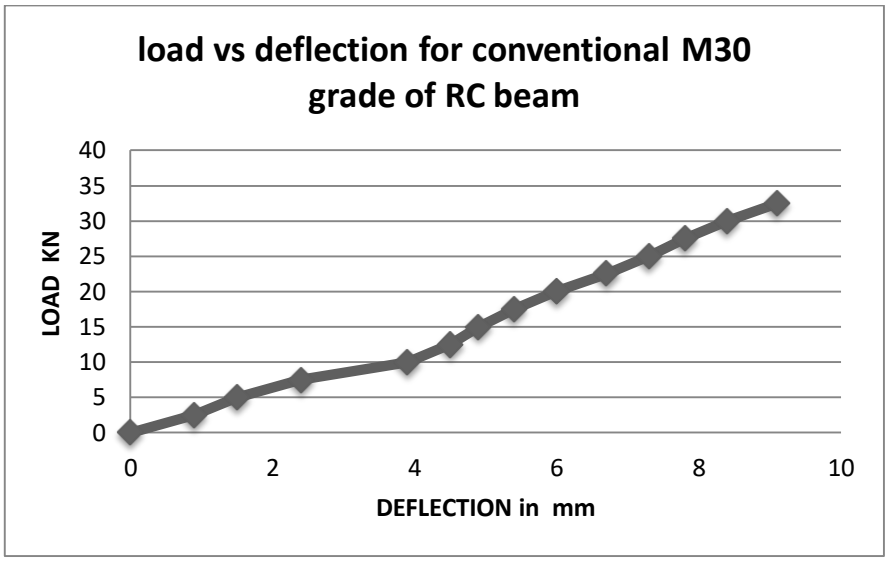

Fig 3: showing the variation of deflection under load for conventional concrete.

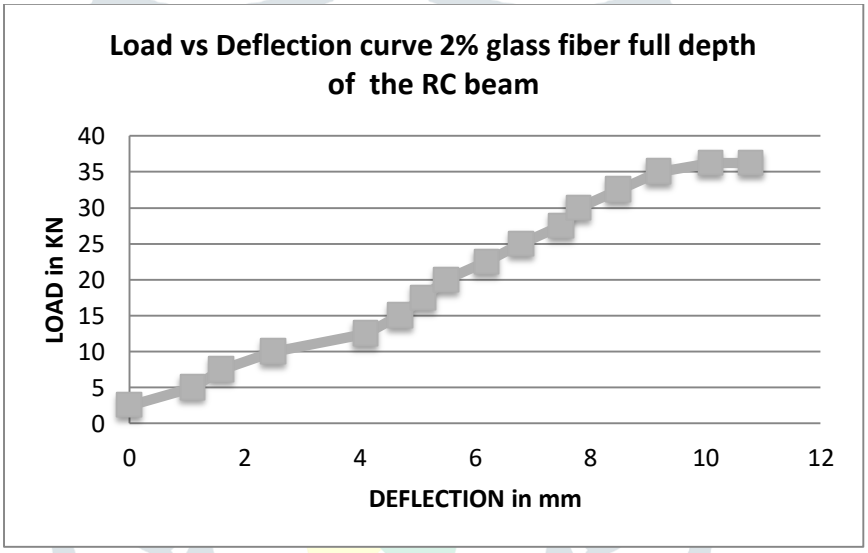

Fig 4: variation of deflection under load for 2% glass fibre added concrete.

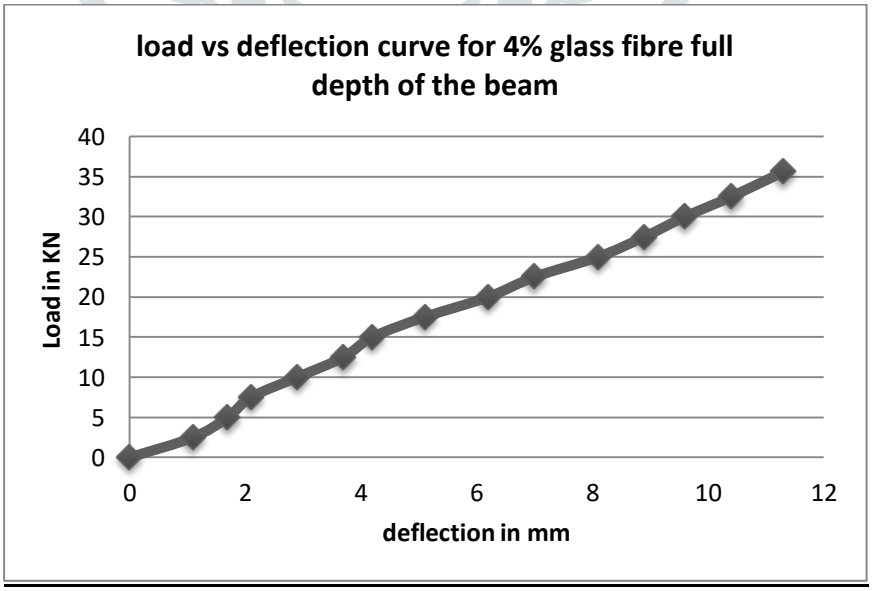

Fig 5: variation of deflection under load for 4% glass fibre added concrete

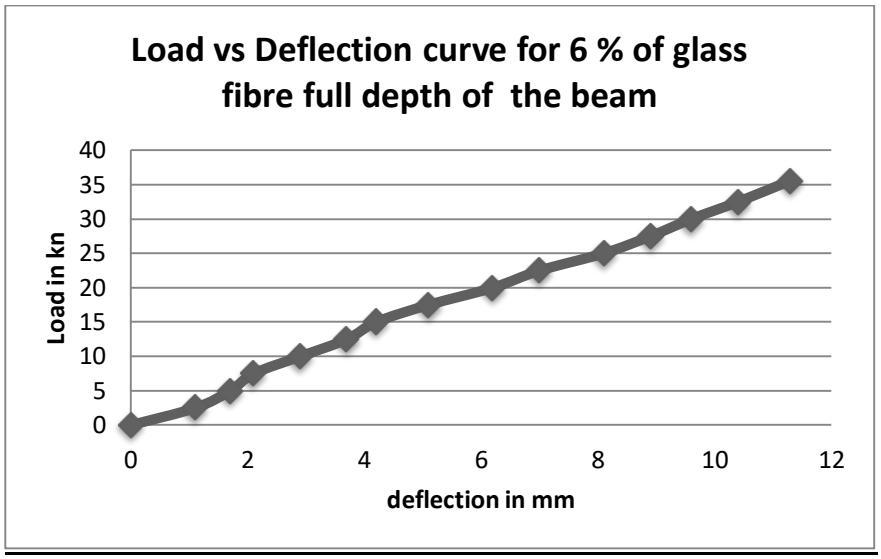

Fig 6: variation of deflection under load for 6% glass fibre added concrete.

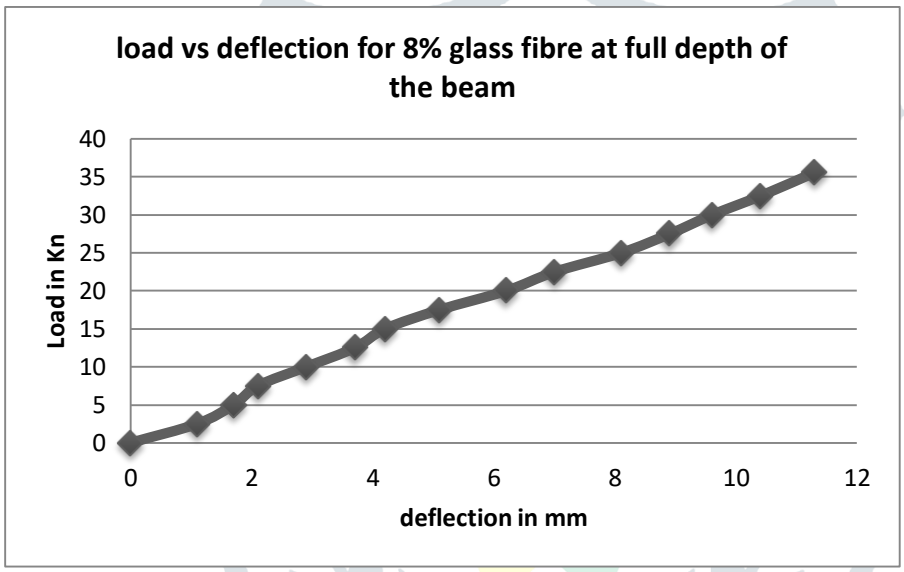

Fig 7: variation of deflection under load for 8% glass fibre added concrete.

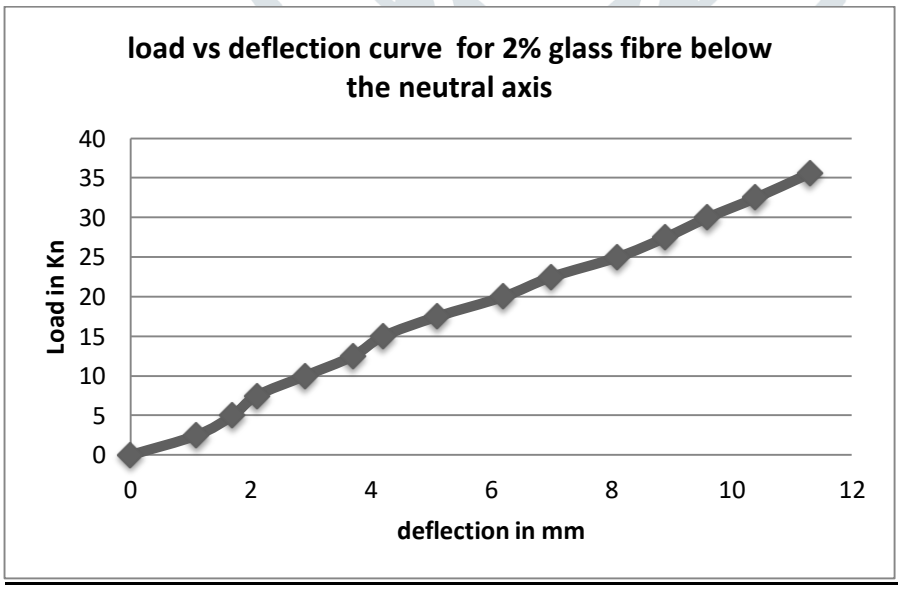

Fig 8: variation of deflection under load for 2% glass fibre added below NA.

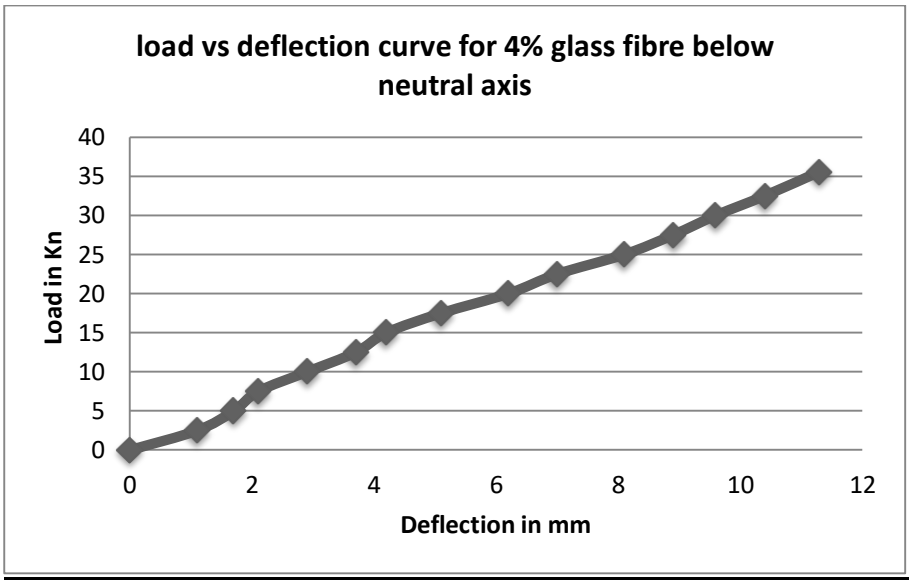

Fig 9: variation of deflection under load for 4% glass fibre added below NA.

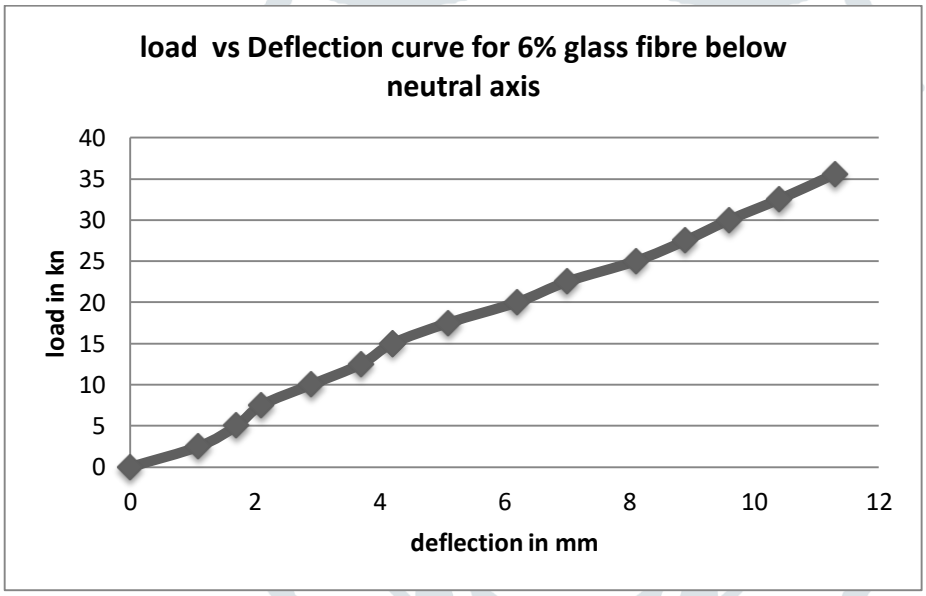

Fig 10: variation of deflection under load for 6% glass fibre added concrete.

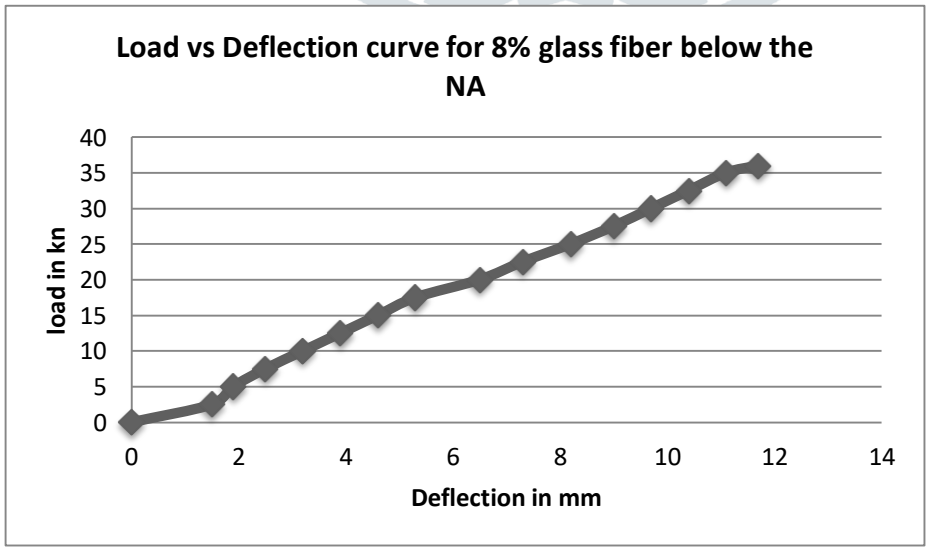

Fig 11: variation of deflection under load for 8% glass fibre added below NA.

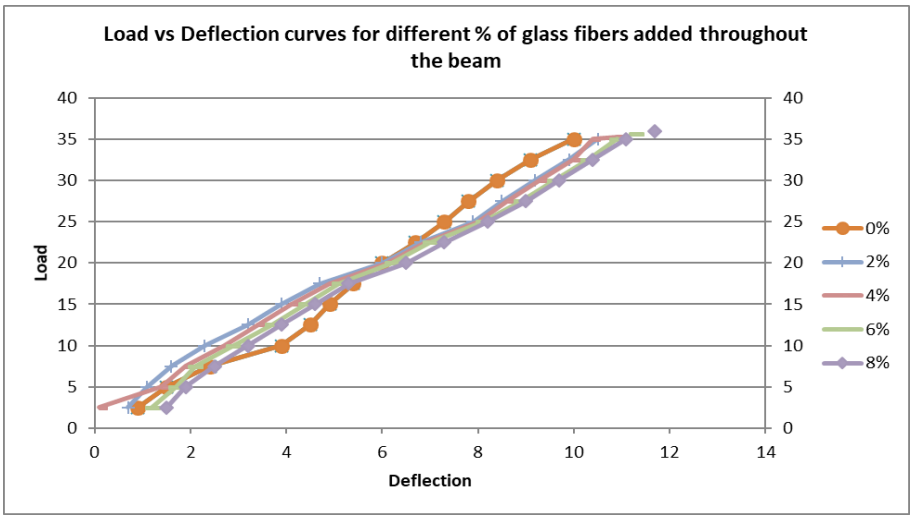

Fig 12: Load- deflection curves for various % of glass fibres

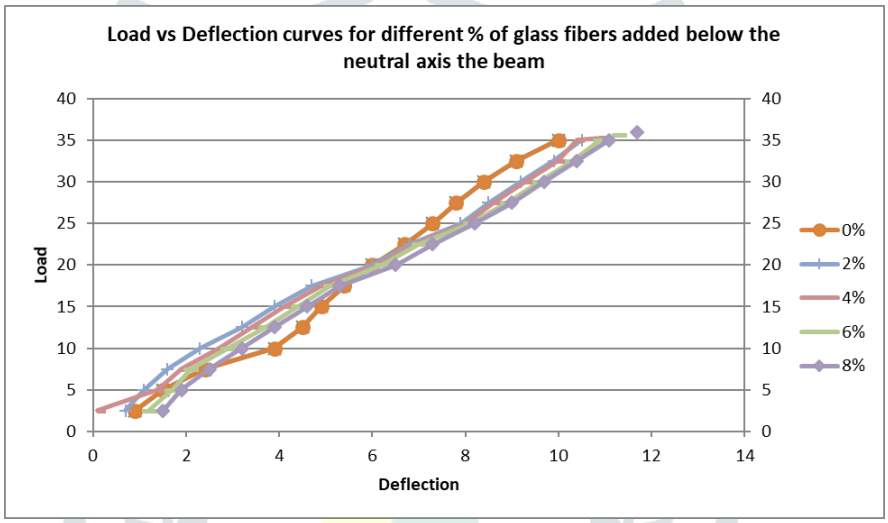

Fig 12: showing the variations of load vs deflection values for various % of glass fibers.

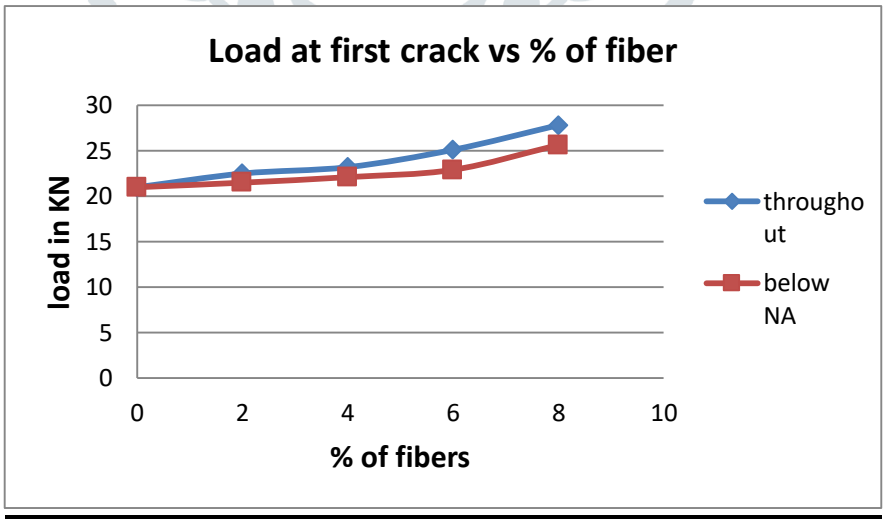

Fig 13: showing the comparison of load at first crack with glass fibres

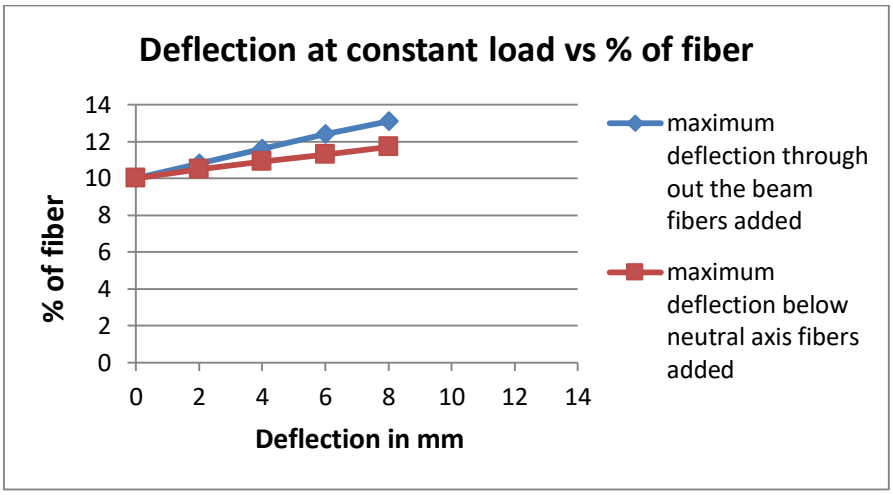

Fig 14: showing the comparison of maximum deflection values at constant load

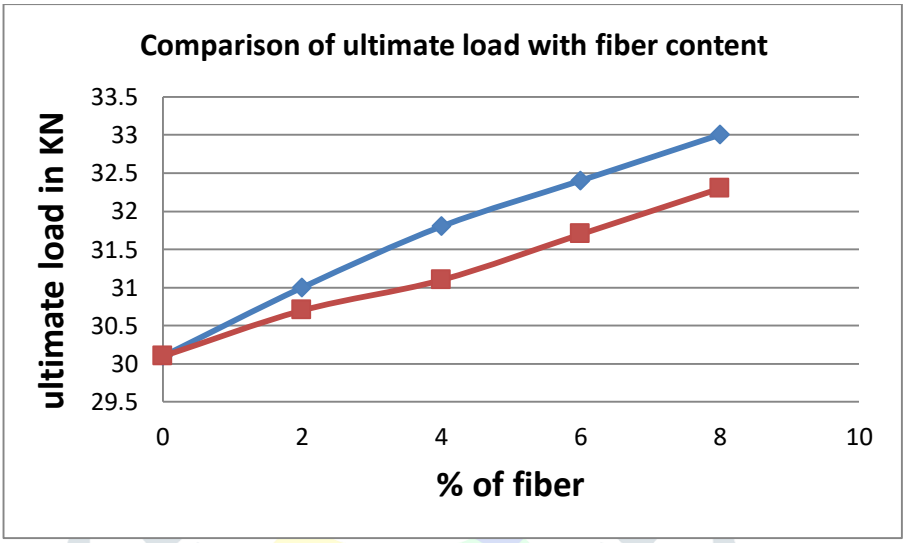

Fig 15: showing the comparison of ultimate load with % of fibre and fibre type

VI.DISCUSSION

(1) The compressive strength of concrete is accumulated by 0.6% for two addition of glass fiber, 1.2% for four-dimensional addition of glass fiber, 1.7% for six addition of glass fiber, 2.5% for 8 May 1945 addition of glass fiber than standard concrete.

(2) The split strength of concrete is accumulated by 0.09% for two addition of glass fiber, 0.16% for four-dimensional addition of glass fiber, 0.22% for six addition of glass fiber, 0.36% for 8 May 1945 addition of glass fiber than standard concrete.

(3) Glass fiber supplementary at various factors throughout the beam

(i) The load initially crack of concrete is accumulated 1.5% for two addition of glass fiber, 2.2% for four-dimensional addition of glass fiber, 4.1% for six addition of glass fiber, 6.8% for 8 May 1945 addition of glass fiber than standard concrete

(ii) the last word load of concrete is accumulated by 0.9% for two addition of glass fiber, 1.7% for four-dimensional addition of glass fiber, 2.3% for six addition of glass fiber, 2.9% for 8 May 1945 addition of glass fiber than standard concrete.

(4) Glass fiber supplementary at various factors below the sodium of the beam

(i)The load initially crack of concrete is accumulated by 0.5 for 2 addition of glass fiber, 1.4% for four-dimensional addition of glass fiber, 2.6% for six addition of glass fiber, 4.6% for 8 May 1945 addition of glass fiber than standard concrete.

(ii) The last word load of concrete is accumulated by 0.6% for two addition of glass fiber, I Chronicles for four-dimensional addition of glass fiber, 1.6% for six addition of glass fiber, 2.2% for 8 May 1945 addition of glass fiber than standard concrete.

(5) From the experimental results once glass fiber is supplementary throughout the beam the load initially crack and supreme load carrying capability has accumulated compared with addition of usual of glass fiber to the beams below the sodium.

VII.CONCLUSIONS

From the on top of discussions the following conclusions have created

1. For the addition of glass fibers, the compressive strength of concrete is accumulated compared to traditional concrete for most of 2.5%
2. For the addition of glass fibers, the split strength of concrete is accumulated for most of 0.36% compared with standard concrete.
3. At 8 May 1945 fiber content, the deflection parameters like load initially crack, associate degree final load were obtained most. These parameters square measure obtained most for glass fibers compared with standard concrete.
4. The utmost deflection was conjointly diminished at 8 May 1945 of fiber content for glass fibers throughout the beam and sodium below the beam and the higher result was ascertained within the case of glass fiber from this glass fibers square measure capable of resistant the upper central deflection underneath load.
5. From final load comparisons, each glass fibers supplementary throughout the beam and glass fibers supplementary below the sodium is the higher one for the increment of final load carrying capability. And this can be obtained most for the glass fibers supplementary throughout the beam.
6. The usage of fibre within the concrete offers higher performance altogether aspects because of the high tensile properties of the fibre.

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