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Experimental Investigation of Reinforced Concrete Considering Fibers as A Replacement of Reinforcement

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ABSTRACT

Concrete is the most principally utilized material in the development field took after by steel as reinforcements. The present day situation is seeing a quick change in the building material industry and step by step new innovations are supplanting the ordinarily utilized materials. Scientists everywhere throughout the world are endeavoring to enhance concrete by the utilization of fibers, pozzolanas and different admixtures. Steel is given in the pressure side fundamentally in order to balance the powerless zone of concrete that is Tension. In spite of the fact that it is thought to be the best for this work yet at the same time it gets eroded by the activity of the nature in this way, emerges the point of searching for an option. A standout amongst the most well-known choices is Fiber strengthened polymer rebars (FRP's). In the present trial examination supplanting of Ordinary Concrete with Glass fiber and bamboo fiber Reinforced Concrete along these lines considered on the progressions of Compressive Strength and Ultimate Crushing loads.

Keywords : Flexural, UTM, Tensile strength, Bamboo, Fiber, loading, flexural strength

I. INTRODUCTION

The general practical monetary development, efficiency, and the prosperity of a country depend vigorously on the usefulness, unwavering quality, and sturdiness of its built offices. Be that as it may, aside the natural and operational condition, the constituent materials representing the expanding instances of basic insufficiency and practical outdated nature are recorded in the constructed environment.

Weakening in solid structures is a noteworthy test looked by the framework and scaffold ventures around the world. The decay is fundamentally because of natural impacts, which incorporates consumption of steel, progressive loss of quality with maturing, rehashed high force stacking, temperature variation, solidification of defrost cycles, contact with synthetic concoctions and saline water and introduction to ultra-violet radiations. This issue, combined with amendments in basic codes expected to represent the characteristic marvels like seismic tremors or natural weakening powers, requests improvement of fruitful basic retrofit innovations. The auxiliary retrofit issue has two alternatives,

repair/retrofit or devastation/remaking. Generally, the pattern inside the US development ventures has been towards the last alternative. This arrangement has turned out to be progressively unsuitable because of changing financial and social states of mind concerning existing structures. This reality prompts the need for advancement of proper auxiliary retrofit/repair frameworks.

II. OBJECTIVES OF THE STUDY

- To determine the flexural properties of R.C.C beam using different composite materials as an replacement of main reinforcement in a beam.
- To determine the variation in strength developed due to glass fiber, bamboo fiber as a main reinforcement in a beam.
- To determine the cost effectiveness of these materials in an R.C.C. beam.
- To justify the use of these waste materials in construction industry.

III. LITERATURE REVIEW

Chand et al. (2017) Established that the Tensile quality of bamboo has been tentatively decided parallel and opposite to the fiber course. Distinctive properties are shown in two ways in bamboo because of the essential basic contrast introduce in the two bearings. Striking contrasts exist in the appropriation of cells inside one culm, both evenly and vertically. Anxiety estimations of bamboo under elastic burdens are additionally dictated by utilizing the Finite Element Method (FEM) programming ABAQUS and the disappointment stack designs have been created and analyzed. Flexural quality and redirection in bamboo decided tentatively matches intimately with the FEM produced values.

Nigarwal et al. (2016) Arranged a relative report between the DC network conduct of bamboo fiber gathered from upper and base part of bamboo, arranged a hypothesis diagram confirmed with the exploratory outcomes.

Akinyele et al. (2015) Discovered that the interfacial bond qualities of rattan-concrete were in the range 0.082 - 0.598 N/mm2 rely upon the species, concrete grade and other normal conditions. The trial consequences of 0.34 - 0.38 N/mm2 got by fall inside the range. Additionally, Youssef gave 0.56 - 0.68 N/mm2 for some bamboo species fortified with concrete. Every one of the discoveries fall in the vicinity of 3.94 and 28.86% of steel-solid bond quality of 2.07 N/mm2 of practically identical solid review (Neville and Brook). It was discovered that the moduli of flexibility for three types of Rattan were 3396, 516 and 11,106 N/mm2 for C. deerratus, E. macrocarpa and L. secundiflorum separately (Lucas and Dahunsi). The utilization of rattan support in lieu of traditional steel fortifications requires better comprehension under hub stacking and execution conditions. examined the flexural conduct of two-way pieces strengthened with rattan and regular fortifications under pivotal stacking.

IV. METHODOLOGY

Table 1. Percentage of fiber replacing cement

Percentage of composite material added			
S.no.	Material	% (by weight)	Replacing
1	Glass fiber	5 %	Cement
2	Bamboo fiber	5 %	Cement
3	Glass fiber + Bamboo fiber	2.5% both	Cement

Universal Testing Machine

The pliable test is led on UTM. It is using pressurized water works a pump, oil in oil sump, stack dial marker and focal catches. The left has upper, center and lower cross heads i.e; example holds (or jaws). Sit still cross head can be climbed and down for alteration. The channels interfacing the lift and right parts are oil pipes through which the drew oil under strain streams on left parts to progressively the cross-heads

TEST PROCEDURE STEPS:-

1. The heap pointer is set at zero by altering the underlying setting handle.
2. The dial gauge is settled and the example for estimating lengthening of little sums.
3. Estimating the distance across of the test piece by vernier caliper at any rate at three places and decide the mean esteem likewise check the measure length.
4. Presently the example is grasped amongst upper and center cross head jaws of the m/c.
5. Set the programmed diagram recording framework.
6. Begin the m/c and take the perusing.
7. The example is stacked bit by bit and the prolongation is noted until the point that the example breaks.

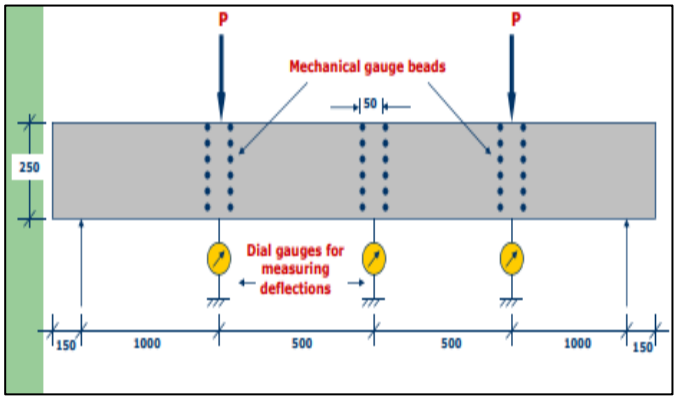

Figure 1. UTM setup

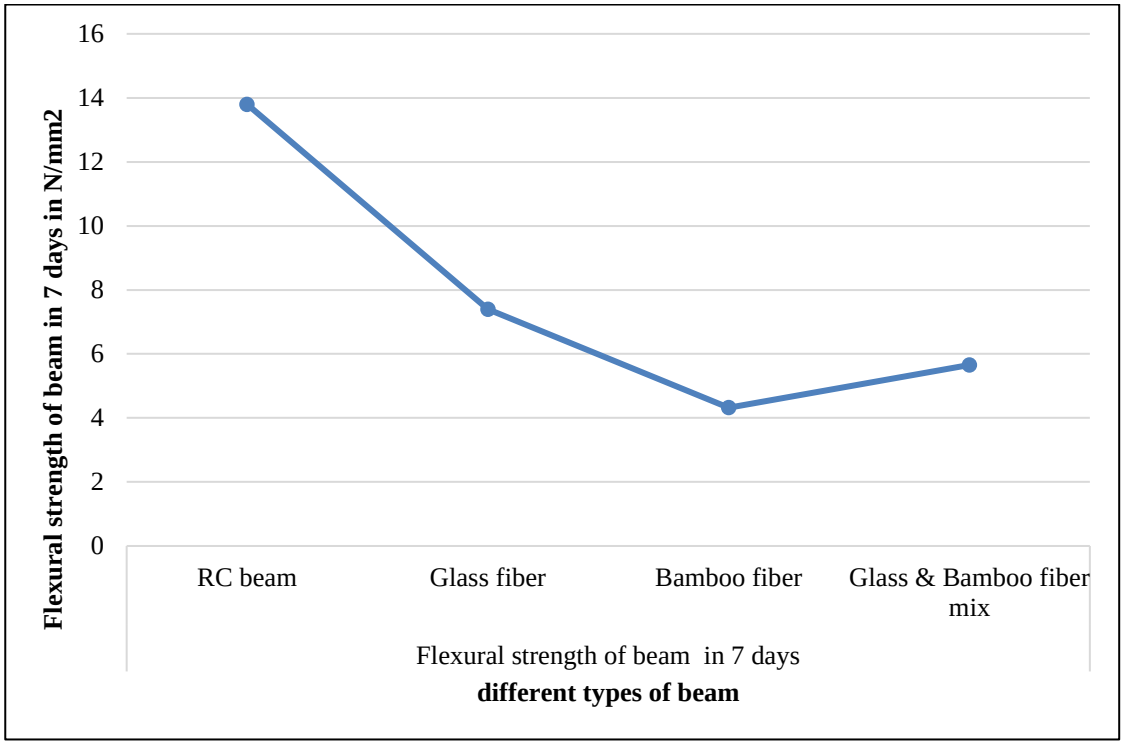

Figure 2. Flexural strength 7 days

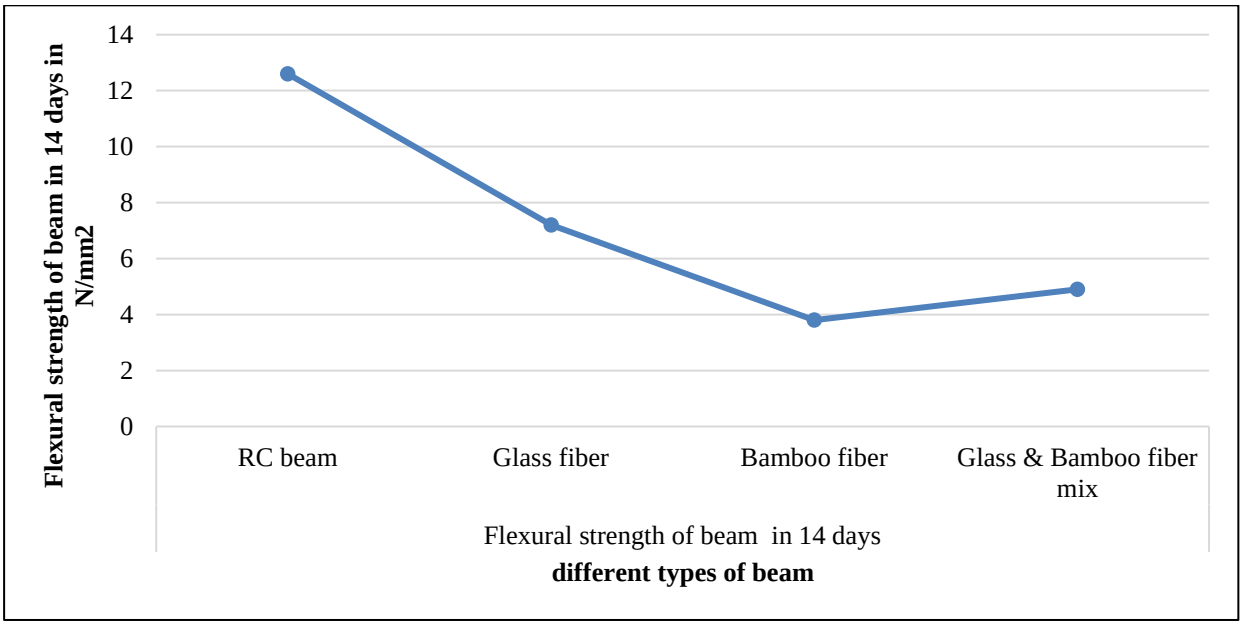

Figure 3. Flexural strength 14 days

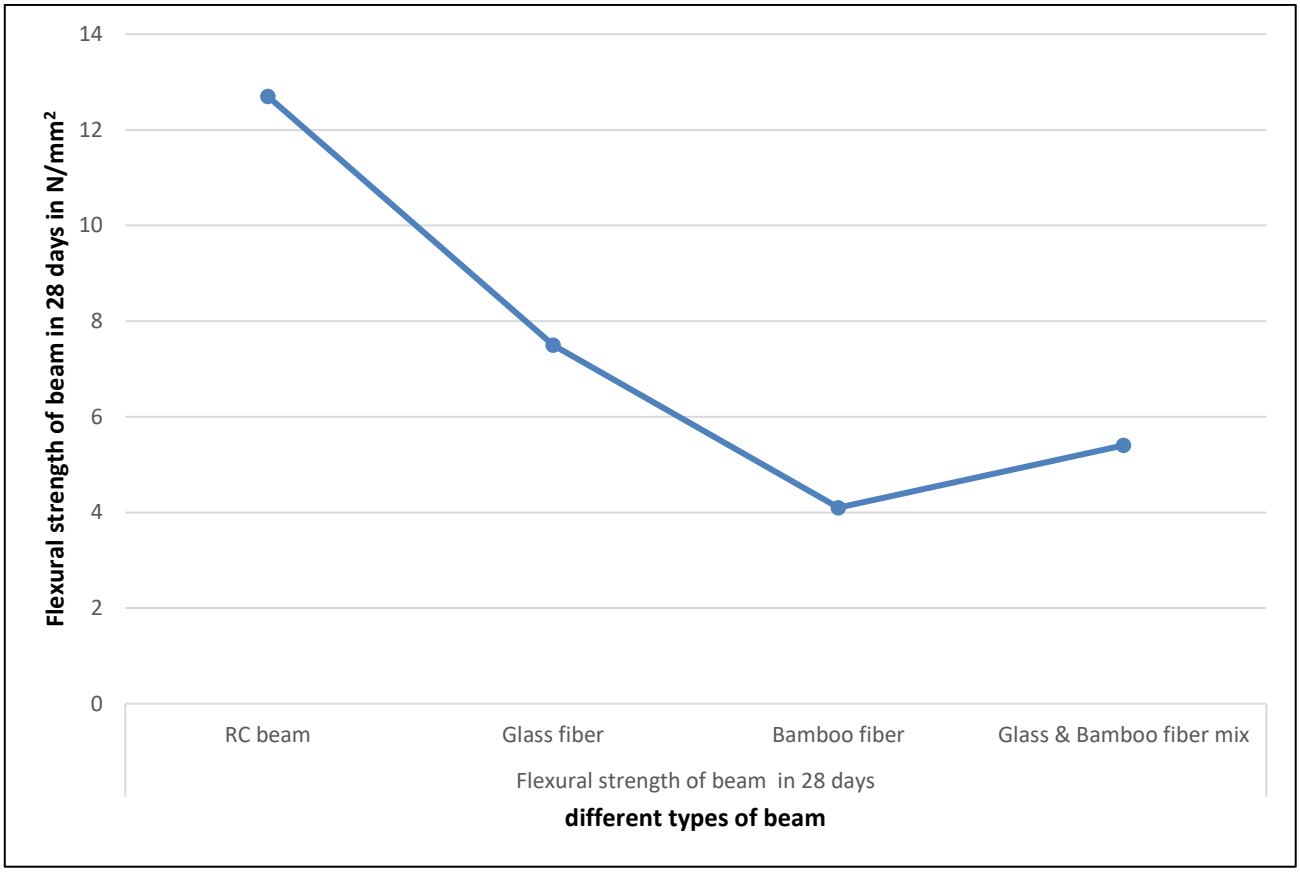

Figure 4. Flexural strength 28 days

Table 3. Represent the values of initial setting time

Sr. No.	Setting Time (Sec)	Penetration (mm)
1.	300	0
2.	600	1
3	900	2.3
4	1200	3.3
5	1500	3.8
6	1800	4.6

Initial setting time

In this project the ordinary Portland cement to be used the initial setting time of this cement paste 30 minute or 1800 second the needle of vicat's apparatus penetrate 4.7 mm from bottom of the mould in 30 min. according to code provision the penetration should be beyond 5.0 ± 0.5 mm

Final setting time

The annular collar of vicat apparatus lef impression on test block at 10 hrs than the final setting time of this cement is 10hrs

V. CONCLUSION

Conclusion are the conclusions mentions below as per results find out in 7 day, 14 day and 28 days sample:

1) The tensile properties of the three reinforcing materials are normally distributed and their stress ratios satisfied the minimum requirement value of 1.08. The strength of Glass fiber and bamboo represented 45% and 17% of that of steel reinforcing bars respectively.
2) The elongation of bamboo did not meet the ductility requirements of 12%, glass fiber marginally satisfied this, but steel rebars fully met the requirements.
3) Bamboo and glass fibre can only be used for lightweight RC structures. The flexural stiffness of bamboo and glass fibre RC beams was about 13.5% and 33% respectively of the conventional steel bars RC beams.
4) The first cracking loads of bamboo and glass fibre RC beams were 31% and 55% respectively of the conventional steel RC beams. The experimental ultimate failure loads of bamboo and glass fibre RC beams were 21% and 48% respectively of the conventional steel RC beams.
5) Bamboo and steel RC beams had 40% residual capacity after the first crack, while glass fibre RC beams had exhausted 75% of its load-carrying capacity after the first crack.

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