

# Concrete's Properties Mixed with Chopped Jute Fibers

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**Abstract:** *In this study deals with the concept of fiber reinforced concrete using jute fiber concrete made of cement is strong in compression but weak in tension and this concrete has little resistance to cracking which limits its use. These restriction can be overcome by blending the concrete with fibrous materials which we called as fiber reinforced concrete. This study includes the strength characteristic of mechanical properties like compression strength, split tensile strength. Tests result shows that the concrete mix with jute fiber can be used in pavement as reinforcing materials.*

**Keywords:** Tensile strength, compressive strength, flexural strength, sustainable development, jute fiber

## 1. Introduction

As we know that the sustainable development with higher strength have growing demand of construction industry. Jute fiber is one of the cheapest natural fibers and it can be obtained at very low price and it doesnot require modern and high quality technology . We can easily by this and it have very high demand because of its low cost, low density and abundance.

To increase the structural strength, it contain fibers material in forced concrete. This concrete has drawbacks that concrete it is brittle, haspoor resistance to crack opening, poor tensile strength. Jute fiber are used for making rope,

jute carpets, gunny bags and various furnishing materials like shopping bags, sail cloth etc.

## 2. Methods

- 1) The jute fibers were soaked in a 6% NAOH solution.
- 2) The fibers were kept immersed in the alkali solution for 2, 3, 4, 7 &8 hrs.
- 3) The fibers have to wash several times with fresh water to remove any sodium hydroxide sticking to the fiber surface.
- 4) Then the fiber were dried at room temp for hours followed by oven drying at 100°C for three hours.



**Chopped fibers**

### Compressive Strength Test

Concrete is a mixture of sand cement and aggregate the concrete strength depends on the individuals compressive of its components, the quality of the materials used, water cement ratio, the ratio of air mixture and many other factors. By conducting this test, one can easily determine the strength psi of the concrete being produced. The compressive strength of concrete range from 15 MPA (2200psi) to 30 MPA (4400psi) for residential concrete and is high in commercial structure. Compressive strength of concrete = Maximum compressive load carried by specimen/ cross sectional area surface of specimen.

### Split Tensile Test

Split tensile strength of concrete is conducted as per IS: 5816- 1999 for testing the concrete cylinder specimens with different concrete of jute fibers for different curing periods such as 7, 28, 56, 90, days. It is observed that at the initial stage i.e. 7 and 28 days the compressive strength of jute fiber reinforced concrete declines with increase in jute content with respect to ordinary concrete. But on furthers curing i.e for 56 days, the compressive strength of jute fiber reinforced concrete increase up to 1% jute content and on further curing the compressive strength of jute fiber reinforced concrete decreases.

**Flexural Strength**

Flexural strength of concrete is conducted as per IS: 516-1959 for testing the concrete prism specimens with different contents of jute fibers for different curing periods such as 7, 28, 56, 90, days

The flexural strength of concrete reinforced with jute fibers increases with jute contents up to 1% and increase in strength continues up to 56 days of curing. On further curing, the flexural strength of JFRC decline with respect to concrete.

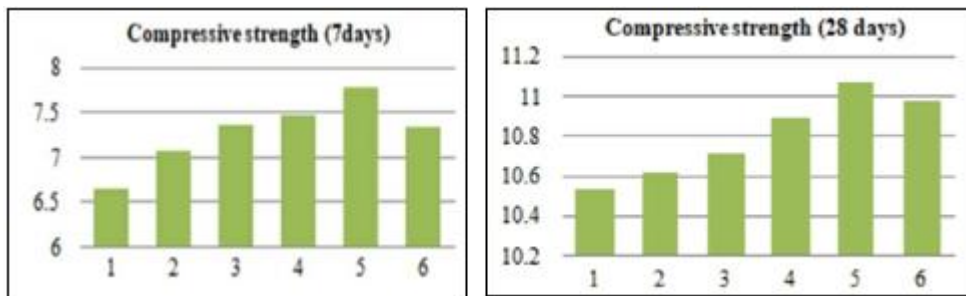
**3. Results and Dicussion**

**Table 1.1:** Observation table for compressive strength of concrete cube specimens

Quantity	Cube ID	Load (KN)	Area (cm) <sup>2</sup>	Comp. strength (P/A)	Days
0%	A	1500	225	6.666	7
1%	B	1590	225	7.066	7
2%	C	1655	225	7.355	7
3%	D	1680	225	7.466	7
0%	A	2370	225	10.533	28
1%	B	2390	225	10.662	28
2%	C	2410	225	10.711	28

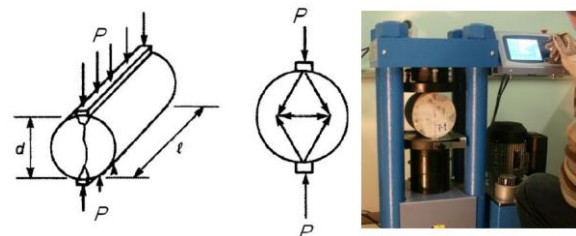


**Compression Test on Cube**



**Table 1.2:** Observation table for split tensile strength of cube specimens

Quantity	Cube ID	Crushing load (KN)	Length (cm)	Depth (cm)	$2p/\pi ld$	Days
0%	A	29.00	15	15	0.082	7
1%	B	32.00	15	15	0.090	7
2%	C	37.00	15	15	0.104	7
3%	D	40.00	15	15	0.113	7
0%	A	31.00	15	15	0.087	28
1%	B	36.00	15	15	0.101	28
2%	C	42.00	15	15	0.008.	28



Split Tensile Test

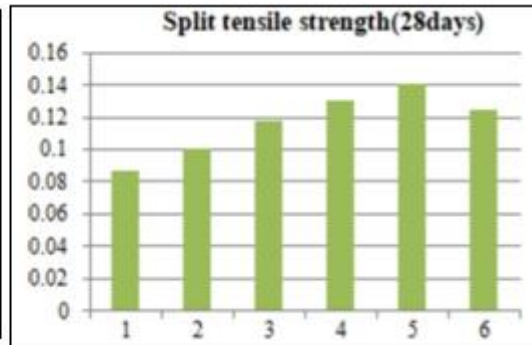
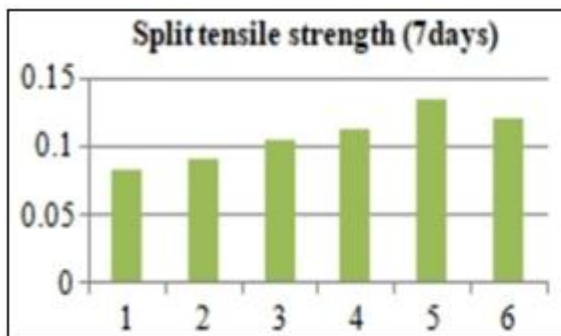
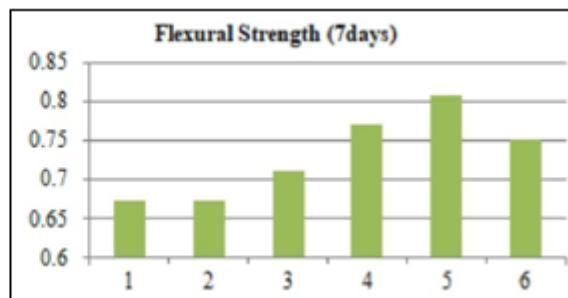
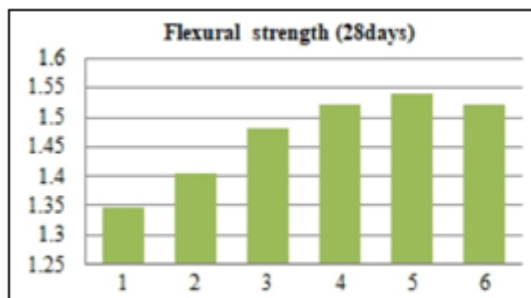


Table 1.3: Observation table for flexural strength of beam specimens

Quantity	Cube ID	Load (P)KN	Leff. (cm)	D (cm)	B (cm)	PLeff/bd <sup>2</sup>	Days
0%	A	35	65	15	15	0.674	7
1%	B	35	65	15	15	0.674	7
2%	C	35	65	15	15	0.712	7
3%	D	37	65	15	15	0.770	7
0%	A	70	65	15	15	1.348	28
1%	B	73	65	15	15	1.405	28
2%	C	77	65	15	15	1.482	28



Flexural Test on UTM



4. Conclusion

The result obtained by this research work indicates that jute fibers reinforced concrete have best mechanical properties. By this means it is concluded that by adding jute fibers, the compressive strength, tensile strength & flexural strength increase to 33% 10% & 12% respectively.

When concrete mix with jute fibers improved the compressive, tensile & flexural strength as well as higher resistance value. This research study aims to evaluate the effect of jute fiber ( chopped) on the compressive strength and tensile strength of the concrete after 7 days and 28 days

References

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