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# Carbon Fiber Reinforced Polmer Strengthening Of Reinforced Concrete Beam with Partial Replacement of Msand

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**Abstract:**
Here the project is supposed to study Carbon fiber reinforced polymer strengthening of Reinforced concrete beam with partial replacement of Msand. De-bonding of carbon fiber reinforced polymers (CFRP) sheets and plates from the concrete substrate is one of the major reasons behind premature failures of beams that are externally strengthened with such CFRP materials. To delay or prevent de-bonding and therefore enhancing the load carrying capacity of strengthened beams, several anchorage systems were developed and used. This paper investigates the use of CFRP mechanical anchorage of CFRP sheets and plates used to externally strengthen reinforced concrete beams under flexure.

**Key Words:** Manufactured Sand, Fine Aggregate, Super plasticizer, CFRP Sheets.

## I.INTRODUCTION

Concrete has several characteristics that make it as a versatile and widely used construction material. New developments backed by years of research have provided today's concrete user with a unique, attractive, and practical product. Architects, engineers, and builders have used concrete with imagination and skill to create exciting and distinctive structures. In the previous study of work the optimum dosage of Manufacturing Sand was carried for M30 grade of concrete. The Manufacturing Sand proportions were added in the percentage of 0%, 25%, 50 It is observed from the study that the maximum strength of concrete is achieved by using 50% of replacement of Fine Aggregate by M sand.Existing reinforced concrete (RC) structures are in severe state of deterioration due to construction faults, carbonation, chloride attack, increase in live load, and corrosion of steel reinforcement. Ageing of RC structures has captured the attention of many researchers to find different materials and techniques to strengthen and retrofit deteriorated structures. The technique of externally strengthening RC slabs and beams in flexure by bonding CFRP plates and sheets to the beam's tensile surface(soffit) via epoxy adhesives had shown a considerable enhancement in the load-carrying capacity and stiffness of the strengthened specimens. Extensive experimental and numerical research studies had been conducted on strengthened RC beams in flexure and the results showed an increase in the flexural capacity of the strengthened beam specimens with CFRP laminates up to 100% over the control unstrengthened specimens when externally bonded to the tensile surface of such beams

## II.EXPERIMENTAL PROGRAMME

## 1.MATERIALS

### 1.1 CARBON FIBRE

Carbon fiber is the most expensive one and more commonly used reinforcement in space applications with the combination of excellent performance and characteristic strength.

### 1.2 M-SAND

It is a substitute of natural river sand for construction purposes, sand produced from hard granite stone by crushing is used. The crushed sand is of cubical shape with grounded edges, washed and graded to as a construction material. The size of manufactured sand (M-Sand) is less than 4.75mm.It can be dust free; the sizes of m-sand can be controlled easily so that it meets the required grading for the given construction

### 1.3 SUPER PLASTICIZERS ( CONPLAST SP430)

CONPLAST SP430 is a high range super plasticizing admixture. It is used in this study to achieve the required workability. The product has been primarily developed for applications in high-performance concrete where the highest durability and performance is required. It is based on Sulphonated Napthalene Polymers and supplied as a brown liquid instantly dispersible in water. It has been specially formulated to give high water reduction upto 25% without loss of workability or to produce high quality concrete of reduced permeability.

### 1.4 COARSE AGGREGATE

The material which is retained on 4.75 mm sieve is termed as coarse aggregate. Crushed stones of size 20 mm are used as coarse aggregate. The coarse aggregate used in concrete cube should be hard, durable, clean, cubical, angular, and minimum of flat and elongated particles.

### 1.5 FINE AGGREGATE

The fine aggregate serve the purpose of filling all the open spaces in between the coarse particles. Thus, it reduces the porosity of the final mass and considerably increases its strength. The material which passes through 4.75 mm sieve is termed as fine aggregate

### 1.6 CEMENT

Ordinary Portland cement 53 grade is used in this project and which is the most important type of cement. The OPC was classified into three grades, namely 33 grade cement, 43 grade cement, 53 grade cement. Generally use of high grade cements offer many advantages for making stronger concrete

## 2.TESTING

### 2.1COMPRESSIVE STRENGTH:

Compressive strength for different mix proportion of concrete was carried out using CTM machine. The testing was done for different days of cured specimens and it was observed that up to The veriouse percentage of the replacement of sand with Msand is 40%,50%,60%. In this case 60% replacement of Msand decreases the compressive strength

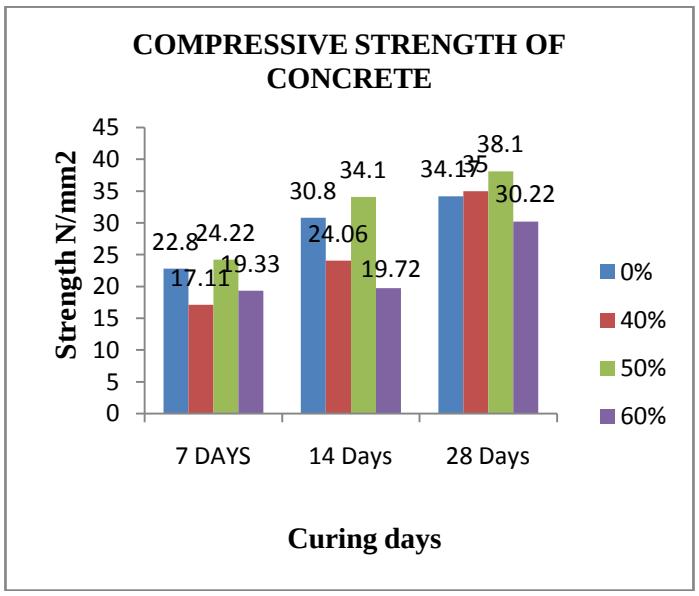


**Figure.1.compressive strength of concrete**

### 2.2 SPLIT TENSILE STRENGTH

Split strength for different mix proportion of concrete was carried out using CTM machine. The testing was done for different days of cured specimens. The various percentage of the replacement of sand with Msand is 40%,50%,60%.

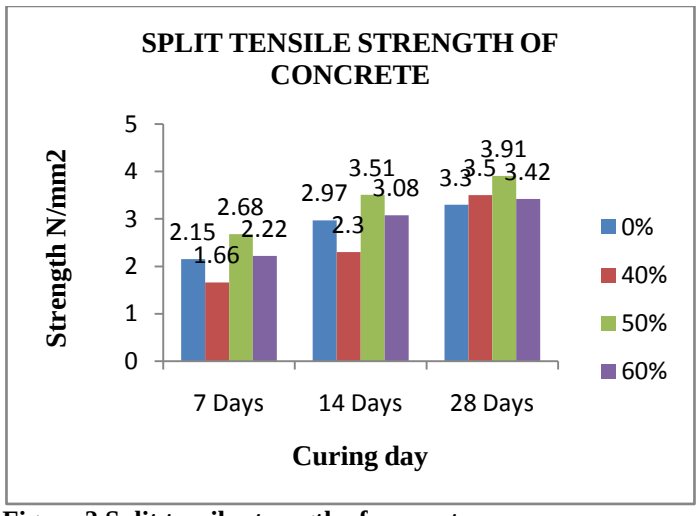


**Figure.2.Split tensile strength of concrete**

### 2.3 FLEXURAL STRENGTH TEST

Flexural strength for different mix proportion of concrete was carried out using UTM machine. The testing was done for different days of cured specimens. The various percentage of the replacement of sand with Msand is 40%, 50%, 60%. In thicase 60%replacement of Msand decreases the flexural strength

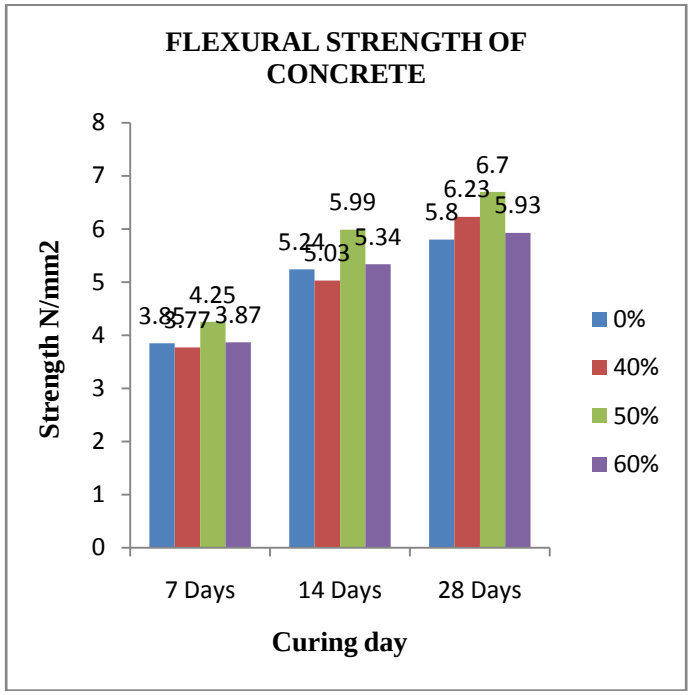


**Figure.3.Flexural strength of concrete**

### 2.4 FLEXURAL STRENGTH ON BEAM

For the obtimum content of Msand i.e., the percentage at which maximum strength is obtained is chosen and beams are casted. Beams are with the dimension of 100x150x1000mm for M30 grade concrete

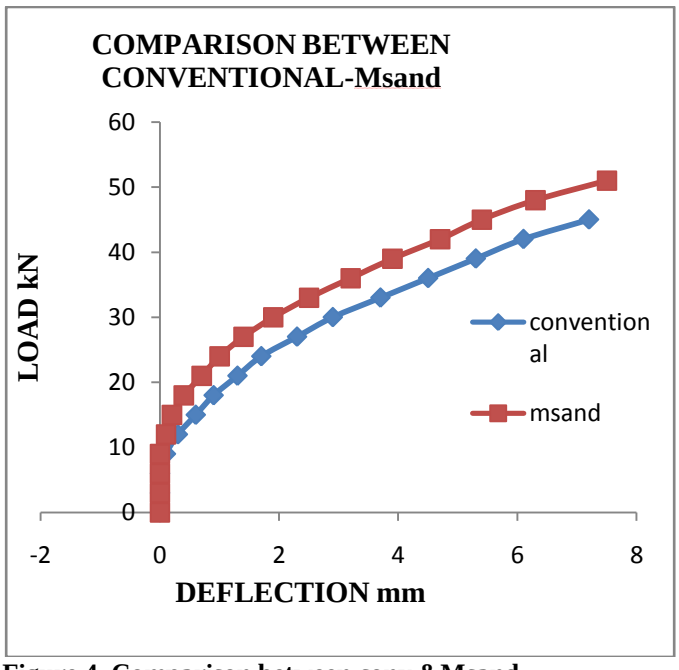


**Figure.4. Comparison between conv.&Msand**

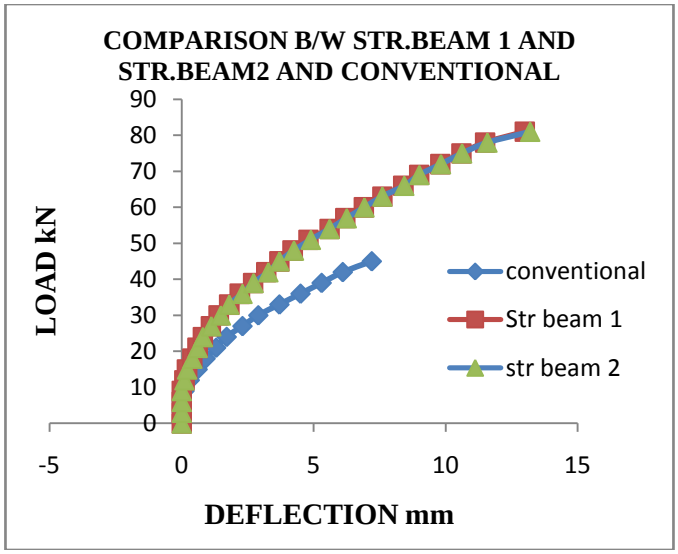

Figure.5.Comparison between conv.& strengthened beams.

## III.CONCLUSION

The following conclusions are drawn from the study of partial replacement of fine aggregate with Msand in the cement concrete. In this study of partial replacement of fine aggregate with Msand have greater strength than the conventional concrete. The compressive strength of concrete are increased with the addition of Msand upto 50% by weight of fine aggregate and further any addition of Msand the compressive strength decreases. High workability is observed for super plasticiser added concrete. Split tensile strength tends to improve for Msand Concrete compared to plain concrete. Flexural strength tends to improve for Msand Concrete compared to plain concrete.

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