# FEASIBILITY STUDY OF FIBRE REINFORCED CONCRETE USING WASTE FISHING NET

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## ABSTRACT

The technology in construction sector has been rapidly gaining a much attention which helps us to make wonders of so many possibilities with concrete structures. In this project a research is conducted in what ways we can use the discarded nylon fibres from waste fishnets which will be beneficial to be used in the construction works. The use of nylon fibres (Fishnets) after the flexibility in the structures. This waste nylon fibre will be served as a stress absorbing to reduce future maintenance cost of that structure. The aim of this research is also to identify the effect of adding the nylon fibres as a reinforcement in concrete structures. After adding the reinforcement , the experiment tests will be performed on the specimen to determine its strength and also to compare it with the normal ordinary concrete.

# CHAPTER 1

## INTRODUCTION

Marine debris is one of the major problems in the sea and ocean environment. It has been reported that more than half of the debris that were dumped or lost directly into the seas, about 640,000 tons, are finishing nets. Almost 700 marine species including marine mammals are at risk; in particular, large whales, seals and sea lions have been found entangled in the fishing Nets. These abandoned fishing nets and debris also disturb marine ecosystem. They block sunlight to reach the smallest creatures such as algae and plantkton. Nowadays, Fishing nets are mostly made of nylon which is non-biodegradable, and totally entangle fishing nets are very difficult to be separated. Therefore, there have been strong calls for recycling waste fishing nets. To meets such demands, a practical, suitable way to recycle them has many been sought many companies, while using recycled and renewable materials have been paid more attention. The waste fishing nets are used in manufactures of carpet tiles, as well as they are melted and then used in manufactures of bicycle seats, chair and luggage castors, tool handles, electronics components, and other goods.

Concrete is a major element for building various types of structures around the world. Generally, the Concrete is reinforced with the steel reinforcement which widely used in the construction sector currently. But, this type of concrete which is reinforced with steel gets affected by deterioration when exposed to certain environment condition. Due to this deterioration the service life of the structure is affected. In today's world many research and studies are conducted in order to improve the durability of structured. We know that, Concrete can resist the load in compression zone, but in tension zone it does not taken the load well, Hence In this study ,The waste nylon fibre will be added as an reinforcement. This nylon fibre can be obtained easily in the form of fishnets which are discarded in the coastal region such as Mumbai. As Nylon fibre is a non-resistance to chemical attack. In this study the nylon fibre is added in proportion accordingly with respect to length and diameters. Such type of reinforced fibre concrete structures can be used for tunnel lining, canal linings, concrete railway bridge pedestal, chimneys, etc. Hence, by introducing the waste nylon fibre in concrete structure the performance in terms of strength / durability will be greatly enhanced and the life span of the structure will also be increased as compared to the standard concrete.

The waste fishing nets basically maintains shape of mesh, it can be easily cut through. This makes it easy to process into form of reinforcing fibers. The waste fishing nets are cut and added to cement concrete .It is dispersed and added to check whether it is effective as reinforcing fiber.

Waste fishing nets are mainly made of petro-chemicals such as nylons or polyethylene, and are difficult to decomposed. It is not decomposed and deposited on sea floor as it is in its original form. As to large mud accumulated over a long period of time, there is a problem that waste fishing nets is wound on the propeller of ship.

Due to lack of statistical data, exact amount is still estimated. Although it is impossible to do it, there are about 2 million closed ropes and closed fishing nets so far. It is estimated that about tons are accumulated in domestic waters. And about 40,000 tones are dumped into sea every year. The life span of nets made of synthetic resins such as nylon is semi permanent.

Only about 25% are being collected. The collected waste fishing nets are also incinerated or it is disposed off in landfills, but when incinerated, large amount of severe air pollutants are generated and landfilled, does not rot for several decades, impeding plant growth,etc.

The waste fishing nets are 2mm, 1.2mm and 0.5mm in diameter and have different thicknesses. The cut length was 4 cm to 9 cm. The general aspect ratio of fibres is and length of reinforcing fibre is too long.

In this case, there is concern about the occurrence of fibre balls during the stirring process. There were many difficulties in the process of cutting. The fibres are randomly distributed. Aspect ratio is defined as ratio of length of fibre to its diameter (L/d). Increase in the aspect ratio upto 75, there is increase in relative strength and toughness. Beyond 75 of aspect ratio there is decrease in aspect ratio and toughness.

# MATERIALS

## 1. CEMENT:-

This Grade Was Introduced in the country by BIS in the year 1987 and commercial production started from 1991.OPC 53 grade cement is required to confirm to BIS specification IS 12269-1987 with a design strength for 28 days being a minimum of 53 MPA or 530 kg/cm$^2$ .

53 OPC provide high strength and durability to structure because of its optimum particle size distribution and superior a saving of 8 to 10 % can be achieve with the use of 53 grade OPC in comparison to other grade.

## Properties of cement:-

i. Fineness of cement
ii. Soundness of cement
iii. Standard consistency of cement
iv. Initial setting time & Final setting time of cement
v. Bulk density
vi. Specific gravity of cement

## 2. Fine Aggregate:-

The material which passes through BIS test sieve number 4 (4.75mm) is termed as fine aggregate usually natural sand is used as a fine aggregate at places where natural sand is not available crushed stone is used as fine aggregates. According to the natural resources from which the sand is obtained, it is termed as Pit sand, River sand and Sea sand. It conforms to IS 383 1970 comes under zone II.

## Properties of fine aggregate:-

i. Fine aggregates provide dimensional stability to the mixture
ii. The elastic modulus and abrasion resistance of the concrete can be influenced with fine aggregate
iii. Fine aggregates quality also influence the mixture proportions and hardening properties
iv. The properties of fine aggregates also have a significant impact on the shrinkage of the concrete

## 3. Coarse Aggregate:-

The material which is retained on BIS test sieve number 4 (4.75mm) is termed as coarse aggregate. The broken stone is generally used as a stone aggregate. Coarse aggregate used is locally available crushed angular aggregate of size 20mm and 10mm are used for this experimental work.

## Properties of coarse Aggregate:-

i. Coarse aggregate refer irregular and granular material such as sand, gravel or crushed stone and are used for making concrete.

ii. In most cases coarse is naturally occurring and can be obtained by blasting , quarries or crushing them by hand or crushers.

iii. Materials that are large enough to retain on the 4.75mm sieve size usually constitute coarse aggregate.

## 4. Nylon Fibre:-

Nylon is a synthetic fibre made from petroleum product. It was developed in 1930 alternative to silk. Nylon is valued for its light weight incredible tensile strength, durability and resistance to damage.it has a very slow decay rate.

## Properties of nylon fibre:-

i. Nylon fibres are very strong , fairly elastic, lightweight and lustrous.
ii. Nylon fibres absorb very little water, so clothes made of nylon are easy to wash and dry.
iii. Nylon is wrinkle resistant.
iv. Nylon fibres have high abrasion resistance, so they are very durable.
v. Nylon is not attacked by moths and ordinary chemicals.

## OBJECTIVES:-

a) To investigate the properties of concrete with the waste nylon fibres.
b) To check the feasibility by using waste nylon fibre in construction works
c) To find out new application for discarded waste fishnets.
d) To verify whether the discarded nylon fibre fishnet as a reinforcement material offers a good performance with respect to the conventional concrete.

## SCOPE:-

a) To verify whether the discarded nylon fibre fishnet as a reinforcement material offers a good performance with respect to the conventional concrete.
b) Studies may be carried out to understand the usage of this materials in pavements.
c) Future studies can be conducted to find out strength, durability by using different matrix.
d) The durability of concrete structures can be increased by adding admixtures proportionally.
e) Research can be conducted by implementing a variety of other fibres for achieving a good efficiency in the structure.

# CHAPTER 2

# REVIEW OF LITERATURE

| Sr. No. | Title | Year | Author | Finding & Summary |
|---|---|---|---|---|
| 1 | Recycled Nylon fibers from waste fishing nets as reinforcements in polymer cement mortar for the repair of corroded RC beams. (Science Direct) | September 2020 | Teeranai Srimahachota, Hiroshi Yokata, Yoshikaza Akira | In this study it has been found that the recycled nylon fibres from waste fishing nets are effective for reinforcing cementitous material and for repairing lightly corroded RC beams. However furthermore improvement can be done in terms of quality of recycled fibres and durability against longer exposure |
| 2 | Application of waste fishing nets in construction (IRJET) | April 2020 | Dr. Vrinda Padhye & Aparna Pangati | a)In this research paper the study of physical and mechanical properties were done for application of waste fishing nets fibres in construction on lab tests.<br>b)M15 concrete when mixed with waste fishing net fibres showed improvement in compressive as well as flexural strength whereas M20 and higher grades of concrete did not showed improvements when mixed with waste fishing nets |

| | | | | |
|---|---|---|---|---|
| 3 | Durability of Nylon fibre Reinforced Concrete. (ICDRM) | March 2019 | Samina Samrose & Rupak Mutsuddy | a)They studied performance of cement mortars mixed with various proportions of nylon fibre content. b)For 0.45% w/c ratio, PCC reinforced with 0.25% nylon fibre is optimum limit and makes structure durable. Using 0.25% nylon fibre structure can withstand any hazardous situation as well as increase its service life. |
| 4 | Discarded nylon fishing nets as fibre reinforcement in cement mortar. (Research Gate) | September 2018 | Ida Bertelsen & Lisbeth M ottosen | a)In this the investigated waste fishing nets had lost tensile strength and elasticity compared to new nylon. b)The reinforced mortars may had taken significant post crack loads, and at 2% the load was at same level as it was with 1% of commercial fibres. |
| 5 | Effectiveness of recycled nylon fibres from waste fishing nets w. r. t fibre reinforced mortar (Technical paper) | August 2017 | Orasathikul, Shonya, Umma, Daiki, Yokata, Hiroshi | i)In this study the authors have conducted tests on two types of nylon fibres i.e a) straight fibres b) knotted fibres ii)The addition of straight fibres improves flexural strength up to 41% as compared to knotted fibres |
| 6 | Reuse of Polyethylene fibres from discarded fishing nets as reinforcement in gypsum based material. (ICCBM) | June 2017 | Ida Bertelson & Lisbeth M Ottosen | a)In this research paper mechanical properties were determined from compression tests and three- point bending tests. Different fibre contents of 0.5, 1.0, 1.5, 1.75 and 2.0 % were examined. |

| | | | | |
|---|---|---|---|---|
| | | | | b)It was found that 2.0% fibre content was the maximum quantity of fibres possible to be mixed properly into gypsum matrix |
| 7 | Engineering Properties of fibres from waste fishing nets. (Research Gate) | August 2016 | Ida Bertelsen & Lisbeth M Ottosen | a)In this research paper, mechanical properties of waste and new fibres from fishing nets were investigated. b)It indicated that the surface of fibres was smooth and might have led poor bonding between fibres and cementitous matrix. Also, tensile strength of waste fibres was reduced with 20% compared to new fibres, built ultimate elongation strain and Young's Modulus was more or less unchanged.. |
| 8 | Recycled Nylon fibres as cement mortar reinforcement | April 2015 | Saverio Spadea, Fernando Praternal, Itenia Farina | In this research paper it has been observed that the effectiveness of recycled nylon fibres obtained from waste fishing nets as tensile reinforcement for mortar had significantly improved up to 35% in the fibre reinforced structures and the compressive strength had increased up to 75%. |
| 9 | Concrete Reinforcement with recycled fibres | November 2000 | Youjiang Wang, H.C. Wu, Victor Cli | In this research paper the authors have constructures by using different types of fibres such as nylon, polypropylene from waste carpets, etc. • The addition of different types of fibres as reinforcement can improve the |

| | | | | |
|---|---|---|---|---|
| | | | | toughness, shrinkage and durability characteristics of concrete.ducted the experiments on concrete |
| 10 | The response of reinforced concrete beams with a fibre concrete matrix to impact loading | August 1986 | A. Banthia & A. Benfast | It had been observed that after adding the fibres in the concrete structure, the relative effect of polypropylene fibre improved the toughness under impact loading in high strength concrete structure as compared to normal concrete structure |

# CHAPTER 3

# PROBLEM DEFINATION

## Problem Statement

Today with the growing construction industry, various technologies and methods are invented as cost effective, ecofriendly along with the strength. The literature referred gives us a brief idea about using fishing net as a reinforcing material. Our study aims at using the scarp fishing nets as a reinforcing material and check the feasibility of same in construction.

As we know that concrete is the main ingredient in construction work and its use is increasing day by day rapidly in our construction sector. But along with more use of concrete, the environment is also getting affected. Hence, we are trying to use the waste materials with concrete which is nylon fibre. It will also help to encourage more use of waste materials in our construction field.

# CHAPTER 4

# METHODOLOGY

For our project we took OPC 53 Grade cement as per IS Standard guidelines. This grade of cement has better quality, strength and less setting time compared to 33 and 43 grades of cement.

Then mould of size (150x150x150)mm was used for casting of our cubes of 1%, 2% and 3% respectively. The oiling of inner sides of mould was done by brushing the sides. Then the cement, sand, fibre and aggregates was dry mixed in the mixer. Then the water was added gradually in the mix for proper mixing of fibres. Then mixing was done for 3 minutes. Then the mix was removed from the mixer into the tray with the help of spatula.

Then mix was filled into the mould in three layers and tamping was done 25 times for each layer, for removing

## TEST ON CEMENT

### 1.Fineness test on cement :-

- ✓ Collect a sample of cement and rub with your hands. The Fineness test sample should be free of lumps.
- ✓ Take 100 gm of cement sample and note its weight as W1.
- ✓ Drop 100 gm of cement in 90 µm sieve and close it with the lid.
- ✓ Now, shake the sieve with your hands by agitating the sieve in planetary and linear movements for 15 minutes.
- ✓ After that take weight the retained cement on the 90 µm sieve as W2.
- ✓ To calculate fineness of cement formula:-

  Fineness = (W2/W1) * 100
- ✓ Then, calculate the percentage of Weight of cement–retained on Sieve.
- ✓ Repeat this procedure with three different samples of cement and average the values for accurate results.


## 2. Standard consistency:-

The standard consistency of any cement is achieved when cement permits the Vicat plunger to penetrate to a point 33 to 35 mm from the bottom of the Vicat mould.

- ✓ First of all, take about 300 gm of cement into a tray and is mixed with a known percentage of water by weight of cement.
- ✓ Let's start with 26% of water and then it is increased by 2% until the normal consistency is achieved.
- ✓ Prepare cement paste by adding 26% of water to 300 gm of cement and mixing it well with taking care that the time of mixing is not less than 3 minutes, nor more than 5 min and the mixing shall be completed before any sign of setting occurs.
- ✓ The mixing time shall be counted from the time of adding water to the dry cement until commencing to fill the mould.
- ✓ Fill the Vicat mould having 80mm diameter and 50mm height with this paste, mould shall be resting upon a non-porous plate (glass plate).
- ✓ After completely filling the mould with cement paste level the top surface removes any extra cement from the top and makes it smooth. Sometimes, shaking should be done to remove any extra air.
- ✓ Place the cement paste-filled mold together with the non-porous resting plate, under the consistency test plunger in the Vicat apparatus.
- ✓ Now, Lower the plunger such that it touches the top surface of mould filled with paste, and quickly release, allowing it to sink into the paste. This process shall be done quickly after filling the mould.

- ✓ Observe the penetration value on the Vicat apparatus scale. It should be around 33 to 35 mm from the mould filled with cement paste. It is not, then increase the % of water and repeat the above steps.
- ✓ Repeat the whole process with varying % of water to cement, until penetration value comes to 33 mm to 35 mm from the top of mould toward the bottom of the mould.

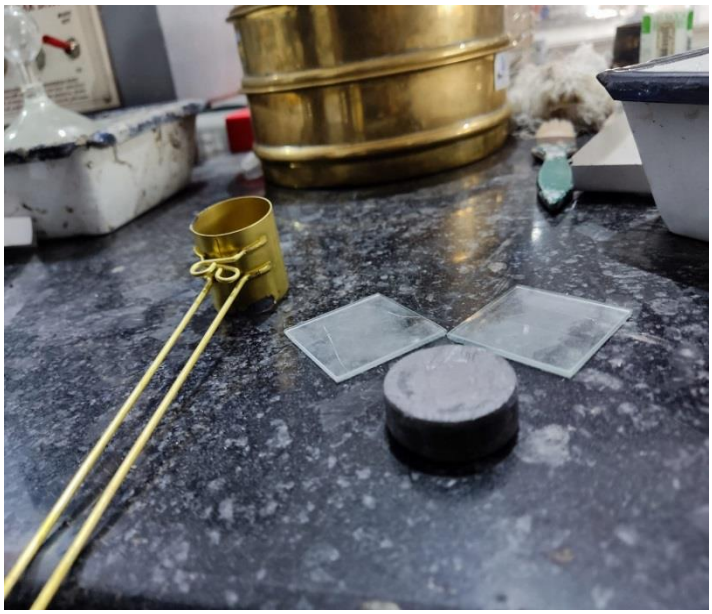
### 3. Initial & Final setting time of cement:-

- ✓ Take 400g of cement and place it in a bowl or tray.
- ✓ Now add water of Start the stopwatch at the moment water is added to the cement. Water of quantity 0.85P.times (Where P is the Standard consistency of cement) is considered.
- ✓ Now fill the mix in Vicat mould. If any excessive paste remained on Vicat mould is taken off by using a trowel.
- ✓ Then, place the VICAT mould on non porous plate (Glass plate) and see that the plunger should touch the surface of VICAT mould gently.
- ✓ Release the Plunger and allow it to sink into the test mould.
- ✓ Note down the penetration of the plunger from the bottom of mould indicated on the scale.
- ✓ Repeat the same experiment at different positions on the mould until the plunger should stop penetrating 5 from the bottom of the mould.
- ✓ The time period elapsed between the moment water is added to the cement and the time, the needle fails to penetrate the mould of 5mm when measured from the bottom of the mould, is the initial setting time of cement.
- ✓ For determining the final setting time, replace the needle of the Vicat's apparatus by the needle with an annular attachment.
- ✓ The cement is considered finally set when upon applying the final setting needle gently to the surface of the test block; the needle makes an impression thereon, while the attachment fails to do so. Record this time ($T_3$)

### 4. Soundness test on cement:-

- ✓ The Le- chatelier mould and the glass plates are lightly oiled before conducting the test

- ✓ Prepare a cement paste as in consistency test with 0. 78 times the water required to give a paste of standard consistency
- ✓ Fill the cement paste in the Le- chatelier mould taking care to keep the edges of the mould gently together during the operation.
- ✓ Cover the mould with another piece of a glass plate and place a small weight over the cover plate.
- ✓ Submerge the whole assembly immediately in water at a temperature of 27o+-2oC and keep it there for 24 hours.
- ✓ Take out the assembly again in water at 27+/- 2 deg C. The distance between the indicator points are measured as A.
- ✓ Submerge assembly again in water at 27 +/- 2 deg C
- ✓ Bring the water to boiling in 25 to 30 minutes and keep at boiling for 3 hours. The assembly should be immersed in water during this process.
- ✓ Remove the mould from water and allow it to cool to 27 +/- 2 deg C
- ✓ Measure the distance between the indicator points as B.



**5. Specific gravity of cement:-**

- ✓ The flask is allowed to dry completely and made free from liquid and moisture. The weight of the empty flask is taken as W1.

- ✓ The bottle is filled with cement to its half (Around 50gm of cement) and closed with a stopper. The arrangement is weighed with stopper and taken as W2.
- ✓ To this kerosene is added to the top of the bottle. The mixture is mixed thoroughly and air bubbles are removed. The flask with kerosene, cement with stopper is weighed and taken as W3.
- ✓ Next, the flask is emptied and filled with kerosene to the top. The arrangement is weighed and taken as W

The specific gravity of the cement formula is as follows,

= (W2 – W1) / ((W2 – W1) – (W3 – W4) X 0.79)

Where,

W1 = Weight of Empty Flask.

W2 = Weight of Flask + Cement.

W3 = Weight of Flask + Cement + Kerosene.

W4 = Weight of Flask + Kerosene.

Here, the specific gravity of kerosene is 0.79g/cc

**Properties of Cement:-**

Cement – IS 4031:1988

Grade – OPC 53

Fineness – 1.1%

Initial setting time- 130min

Final setting time- 255 min

Consistency- 27.9%

Specific Gravity-3.12

Soundness- 1.5mm

# TEST ON SAND

## 1. Sieve Analysis:-

- ✓ Weighed the sample to exactly 1000g.
- ✓ First of all, we have to clean all the sieves using a wire brush to be clear of aggregates stuck in some gaps.
- ✓ Then we have to prepare the sieves onto the shaking machine from top to bottom, by the size from biggest (4,75mm) to smallest (0.075mm).
- ✓ The sample is sieved by using the set of IS Sieves for 10 minutes.
- ✓ After the sieving is done, the aggregates on each sieve are weighed individually.
- ✓ Cumulative weight passing through each sieve is calculated as a percentage of the total sample weight.
- ✓ The same procedure is followed for two more samples

# TEST ON AGGREGATE

## 1. Water absorbent:-

- ✓ About 2 kg of aggregate sample is taken, washed to remove fines and then placed in the wire basket. The wire basket is then immersed in water, which is at a temperature of 220C to 320C.
- ✓ Immediately after immersion the entrapped air is removed from the sample by lifting the basket 25 mm above the base of the tank and allowing it to drop, 25 times at a rate of about one drop per second.
- ✓ The basket, with aggregate are kept completely immersed in water for a period of 24 ± 0.5 hour.
- ✓ The basket and aggregate are weighed while suspended in water, which is at a temperature of 220C to 320C.
- ✓ The basket and aggregates are removed from water and dried with dry absorbent cloth.
- ✓ The surface dried aggregates are also weighed.
- ✓ The aggregate is placed in a shallow tray and heated to 100 to 1100C in the oven for 24 ± 0.5 hours. Later, it is cooled in an airtight container and weighed.

## 2. Dry Bulk density:-

- ✓ Take the weight of the empty measure (W) to the nearest 0.05kg, as per procedure provided above.
- ✓ Fill the measure to in three layers and compact the aggregate in three layers using one of the three methods based on the aggregate size.
- ✓ Method A Rodding for maximum aggregates size of 37.5 mm or less, Method B—Jigging for maximum aggregates size greater than 37.5 mm and not exceeding 125 mm, and Method Shoveling to determine the loose bulk density of the aggregate

**Properties of aggregate:-**

1. **Fine Aggregate – IS 2386:1963**

Water absorption- 2.7%

Specific Gravity- 2.49

Dry loose Bulk density- 1.65

FA confirms to zone- II

2. **Coarse Aggregate- IS 2386:1963**

Water absorption- 2.82%

Specific Gravity- 2.69

Dry loose Bulk density – 1.46

# MIX DESIGN

Grade of concrete M25

Grade of cement (OPC 53 Grade)

1) Target strength:-

f'ck = fck + 1.65s

= 25 + 1.65 (4)

= 31.6 N/mm$^2$

OR

F'ck = fck + X

= 25 + 5.5

= 30.5 N/mm$^2$

31.6 > 30.5

Target mean strength is 31.6 N/mm$^2$

2) Air content:-

For 20mm aggregate = 1%

3) Water cement ratio:-

From curve 3 (53 OPC )

w/c =0.57

4) Selection of water content:-

For 20mm aggregate 186kg (50mm slump)

75mm slump 3%

100mm slump 6%

125mm slump 9%

150mm slump 12%

Then assume 75mm slump

= 186 + (3/100) X 186

= 191.58 kg/lit

= 191 litre

No admixture is used so no reduction in water content.

5) Cement content:-

(w/c) = 0.57

(191/c) = 0.57

Cement content = 335.087 kg

6) Proportion of volume of coarse aggregate and fine aggregate content:-

As per table no.5 IS 10262-2019

Size of aggregate 20mm (Assume zone 3)

For having w/c = 0.57

Aggregate ratio = 0.64

(0.04/0.05) = 1.4 Times of 0.01

So 0.014 (Decreased)

=0.64 – 0.014

=0.626

Correct proportion of volume of coarse aggregate

w/c = 0.57 =0.63

For pumpable concrete these value should be reduced upto 10%

0.63 x (1-0.1) = 0.567 say 0.58

Volume of fine aggregate

= 1-0.58

= 0.42

7) Mix design calculation:-

- ✓ For 1$m^3$ concrete
- ✓ Air content = (1/100)= 0.01 $m^3$
- ✓ Volume of cement

  = (Mass of cement / specific gravity of cement) x (1/1000)

  =(335.087/3.12) x (1/1000)

  = 0.1074 $m^3$
- ✓ Volume of water

  = (Mass of water / specific gravity of water) x (1/1000)

  =(191/1) x (1/1000)

  = 0.191 $m^3$
- ✓ Volume of all in aggregate

  =(1-2)-(3+4)

  = (1-0.01) –(0.107 +0.191)

  =0.692 $m^3$
- ✓ Mass of coarse aggregate

  = Volume of all in aggregate x Volume of fine aggregate x specific gravity of fine aggregate x 1000

  =0.692 x 0.42 x 2.49 x 1000

  =732.69 kg/$m^3$

# CHAPTER 5

# RESULTS AND CONCLUSION

## COMPRESSION TEST RESULTS

### (7 Days)

| Sr.No. | Cube Grade | ID mark | Dimensions of cube (mm) | | | C/S Area ($mm^2$) | Age (Days) | Mass of sample (gm) | Peak Load | Compressive Strength ($N/mm^2$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | B | H | | | | | At testing days | Average |
| | | | 150 | 150 | 150 | 22500 | | 8283 | 425.60 | 18.92 | |
| | | | 150 | 150 | 150 | 22500 | | 8466 | 429.70 | 19.10 | |
| | | | 150 | 150 | 150 | 22500 | | 8458 | 431.50 | 19.18 | |
| | | | 150 | 150 | 150 | 22500 | | 8321 | 442.10 | 19.65 | |
| | | | 150 | 150 | 150 | 22500 | | 8555 | 446.80 | 19.86 | |
| | | | 150 | 150 | 150 | 22500 | | 8484 | 443.50 | 19.71 | |
| | | | 150 | 150 | 150 | 22500 | | 8441 | 462.50 | 20.56 | |
| | | | 150 | 150 | 150 | 22500 | | 8461 | 458.30 | 20.37 | |
| | | | 150 | 150 | 150 | 22500 | | 8336 | 466.90 | 20.75 | |
| | | | 150 | 150 | 150 | 22500 | | 8514 | 441.00 | 19.60 | |
| | | | 150 | 150 | 150 | 22500 | | 8451 | 439.70 | 19.54 | |
| | | | 150 | 150 | 150 | 22500 | | 8228 | 443.50 | 19.71 | |

Table no.1

**(14 Days)**

| Sr.No. | Cube Grade | ID mark | Dimensions of cube (mm) | | | C/S Area ($mm^2$) | Age (Days) | Mass of sample (gm) | Peak Load | Compressive Strength ($N/mm^2$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | B | H | | | | | At testing days | Average |
| | | | 150 | 150 | 150 | 22500 | | 8422 | 498.5 | 22.16 | |
| | | | 150 | 150 | 150 | 22500 | | 8464 | 499.2 | 22.19 | |
| | | | 150 | 150 | 150 | 22500 | | 8435 | 491.7 | 21.85 | |
| | | | 150 | 150 | 150 | 22500 | | 8387 | 514.6 | 22.87 | |
| | | | 150 | 150 | 150 | 22500 | | 8462 | 512.9 | 22.80 | |
| | | | 150 | 150 | 150 | 22500 | | 8399 | 510.8 | 22.70 | |
| | | | 150 | 150 | 150 | 22500 | | 8445 | 537.8 | 23.90 | |
| | | | 150 | 150 | 150 | 22500 | | 8426 | 538.4 | 23.93 | |
| | | | 150 | 150 | 150 | 22500 | | 8512 | 541.9 | 24.08 | |
| | | | 150 | 150 | 150 | 22500 | | 8534 | 521.2 | 23.16 | |
| | | | 150 | 150 | 150 | 22500 | | 8465 | 523.5 | 23.27 | |
| | | | 150 | 150 | 150 | 22500 | | 8540 | 518.4 | 23.04 | |

Table no.2

**(28 Days)**

| Sr.No. | Cube Grade | ID mark | Dimensions of cube (mm) | | | C/S Area ($mm^2$) | Age (Days) | Mass of sample (gm) | Peak Load | Compressive Strength ($N/mm^2$) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | B | H | | | | | At testing days | Average |
| | | | 150 | 150 | 150 | 22500 | | 8422 | 587.6 | 26.12 | |
| | | | 150 | 150 | 150 | 22500 | | 8464 | 582.1 | 25.87 | |
| | | | 150 | 150 | 150 | 22500 | | 8435 | 590.4 | 26.24 | |
| | | | 150 | 150 | 150 | 22500 | | 8406 | 592.4 | 26.33 | |
| | | | 150 | 150 | 150 | 22500 | | 8377 | 599.6 | 26.65 | |
| | | | 150 | 150 | 150 | 22500 | | 8531 | 603.5 | 26.82 | |
| | | | 150 | 150 | 150 | 22500 | | 8462 | 623.7 | 27.72 | |
| | | | 150 | 150 | 150 | 22500 | | 8491 | 635.6 | 28.25 | |
| | | | 150 | 150 | 150 | 22500 | | 8403 | 638.1 | 28.36 | |
| | | | 150 | 150 | 150 | 22500 | | 8428 | 605.7 | 26.92 | |
| | | | 150 | 150 | 150 | 22500 | | 8491 | 615.6 | 27.36 | |
| | | | 150 | 150 | 150 | 22500 | | 8230 | 612.5 | 27.22 | |

Table no.3

# GRAPHICAL REPRESENTATION OF COMPRESSION TESTS

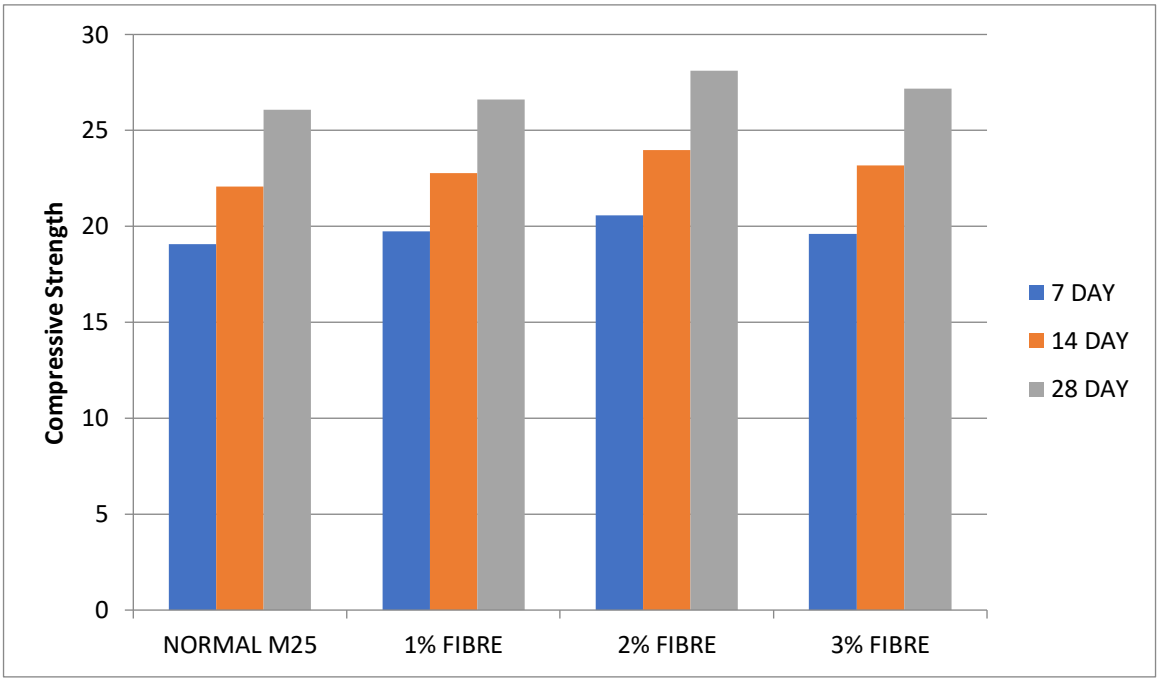



Fig.no.1

# FLEXURAL TEST RESULTS

| Sr. No. | ID Mark | Size of Beam | Age (Days) | Span length (L, mm) | Max. Load (P ,KN) | Position of fracture (a, mm) | Flexural strength ($N/mm^{2)}$ | Average |
|---|---|---|---|---|---|---|---|---|
| | | | | | 11.21 | 122 | 4.10 | |
| | | | | | 11.53 | 134 | 4.61 | |
| | | | | | 11.72 | 270 | 4.69 | |
| | | | | | 15.8 | 133 | 6.30 | |
| | | | | | 14.9 | 126 | 5.63 | |
| | | | | | 16 | 133 | 6.38 | |
| | | | | | 14.9 | 120 | 5.36 | |
| | | | | | 15.2 | 136 | 6.07 | |
| | | | | | 15.8 | 142 | 6.32 | |
| | | | | | 7.8 | 130 | 3.04 | |
| | | | | | 7.6 | 144 | 3.04 | |
| | | | | | 7.9 | 138 | 3.16 | |

Table no 4

## GRAPHICAL REPRESENTATION OF FLEXURAL TEST STRENGTH

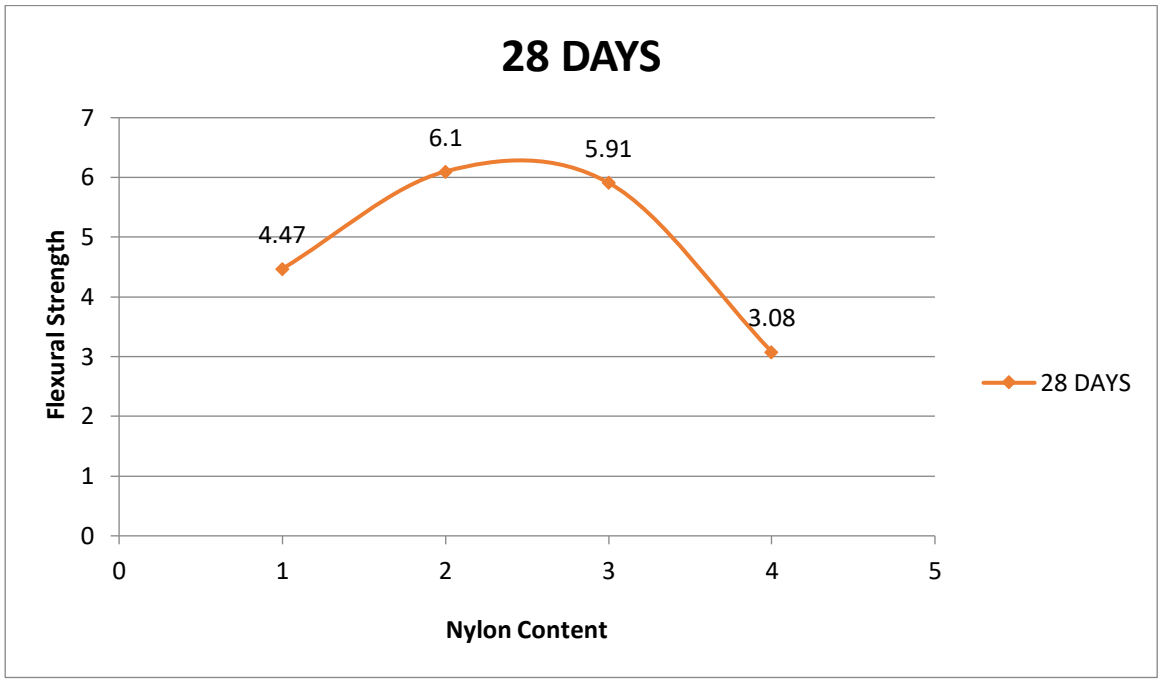



Fig No.2

# PROPERTIES OF MATERIALS

| M25 MIX DESIGN |
|---|
| Cement (IS 4031:1998) |
| Grade :- OPC 53 |
| Fineness:-1.15% |
| Initial setting time:- 130 min |
| Final setting time :- 255 min |
| Soundness:- 1.5 mm |
| |
| Coarse Aggregate (IS 2386:1963) |
| Water Absorbtion:-2.82% |
| Dry loose Bulk Density (DLBD):- 1.46 |
| |
| Fine Aggregate (IS 2386:1963) |
| Water absorbtion:- 2.7% |
| Dry loose Bulk Density (DLBD):-1.65 |
| FA Confirms to Zone:- II |

Table no.5

# COST ANALYSIS

1. Conventional concrete:-

| Sr.no. | Material | Cost (Rs/kg) | Quantity (kg) | Total |
|---|---|---|---|---|
| 1 | Cement | 8.8 | 262.08 | 2306 |
| 2 | Fine aggregate | 3 | 393.12 | 1179 |
| 3 | Coarse aggregate | 1.5 | 786.25 | 1179 |
| Total | | | | Rs 4664/$m^3$ |

2. Fibre concrete:-

| Sr.no. | Material | Cost (Rs/kg) | Quantity (kg) | Total |
|---|---|---|---|---|
| | Cement | 8.8 | 262.08 | 2306 |
| | 1% Fibre | 8.8 | 259.46 | 2203 |
| | 2% Fibre | 8.8 | 256.84 | 2260 |
| | 3% Fibre | 8.8 | 254.22 | 2237 |
| 2 | Fine aggregate | 3 | 393.12 | 1179 |
| 3 | Coarse aggregate | 1.5 | 786.25 | 1179 |
| 1% fibre replace with cement | | | | Rs 4641 /$m^3$ |
| 2% fibre replace with cement | | | | Rs 4618 /$m^3$ |
| 3% fibre replace with cement | | | | Rs 4595 /$m^3$ |

# CONCLUSION

After conducting the experiment on the waste fishnet fibre reinforced concrete it has been observed that upto certain percentage the strength of the concrete is increased i.e. for 1% and 2% of nylon fibre addition.

But for 3%nylon fibre the strength is decreased this maybe because of workability factor, the concrete lost its strength.

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- Teeranai Srimahachota , Hiroshi Yokata , Yoshikaza Akira , Published in **September 2020,** Recycled Nylon fibres from fishing nets as reinforcements in polymer cement mortar for the repair of corroded RC beams.
- Samina Samrose and Rupak Mutsuddy , Published in **March 2019** , Durability of Nylon fibre reinforced concrete.
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- Recycled Nylon fibres as cement mortar reinforcement, Published in **November 2000,** Concrete Reinforcement with recycled fibres
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# PUBLICATIONS

- ✓ The research paper has been submitted for publishing in **"TRENDS N HERALD IN ENGINEERING EXCELLENCE AND METAMORPHOSIS THEEM-2022 CONFERENCE"** under the Feasibility study of fibre reinforced concrete by using waste wishing nets.

  Paper ID:- CEV251940

- ✓ The research paper has been submitted for publishing in**"IRJMETS"** under the Feasibility study of fibre reinforced concrete by using waste wishing net.

  Paper key:- IRJMETS40500058220