iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH
IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 Issue: VI Month of publication: June 2022

DOI: https://doi.org/10.22214/ijraset.2022.44425

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VI June 2022- Available at www.ijraset.com

Study on Strength Parameters on Fibers Using M30 Concrete

J Deepak[1], N Manoj Kumar[2]
[1]PG Scholor, [2]Assistant Professor, Department of Civil Engineering, GIET University, Gunupur, India

Abstract: ***This project work is associate degree experimental investigation on the influence of polyester and glass fibers on mechanical properties of the concrete employed in Construction. during this study 2 varieties of concrete mixes were ready one by one. polyester of 1% to 4% and Glass fiber of 1% to 3% by weight of cement were further to the mixes. A comparative analysis has been allotted for typical concrete with regard to the fiber strengthened in regard to their Compressive, Spilt tensile and Flexural Strength properties. because the Fiber content will increase Compressive, spilt tensile and Flexural Strengths area unit proportionately increasing. it's discovered that fibers multiplied on the far side 3% polyester and 2% glass fiber content leads to decrease in strengths. Economic analysis is indicating that with the addition of polyester and glass fibers will increase in economy results in higher initial value by eight to Martinmas is balanced by the reduction in maintenance and rehabilitation operations by using Fiber concrete as compared thereto of typical Concrete.***

I. INTRODUCTION

In present a large vary of engineering materials (including ceramics, plastics, cement and gypsum products) incorporate fibers to boost composite properties. the improved properties include enduringness, compressive strength, modulus crack resistance, crack management, durability, fatigue life, resistance to impact and abrasion, shrinkage, expansion, thermal characteristics, and hearth resistance. The strength and sturdiness of concrete is modified by creating acceptable changes in its ingredients like building material material, mixture and water and by adding some special ingredients. thus concrete is incredibly likeminded for a large vary of applications. However, concrete has some deficiencies as low enduringness, low post cracking capability, crispiness and low malleability, restricted fatigue life, ineffective of accommodating massive deformations, low impact strength. Cement concrete is characterized by brittle failure, the nearly complete loss of loading capability, once failure is initiated.

This characteristic, that limits the appliance of the fabric, can be overcome by the inclusion of a little quantity of short indiscriminately distributed fibers (steel, glass, synthetic and natural) and might be practiced among others that remedy weaknesses of concrete, such as low growth resistance, high shrinkage cracking, low sturdiness, etc. The presence of small cracks at the mortar-aggregate interface is liable for the inherent weakness of plain concrete. The weakness is removed by inclusion of fibers within the combine. Different types of fibers, like those employed in ancient composite materials are introduced into the concrete mixture to extend its toughness, or ability to resist crack growth. The fibers facilitate to transfer hundreds at the interior small cracks. Such a concrete is named fiber reinforced concrete (FRC). so fiber-reinforced concrete could be a material basically consisting of standard concrete or mortar strengthened by fine fibers. Fiber concrete (FRC) could be a cementing concrete strengthened mixture with a lot of or less randomly distributed little fibers.

In the FRC, variety of little fibers area unit spread and distributed indiscriminately within the concrete at the time of blending and so improve concrete properties in all directions. The fibers facilitate to transfer load to the interior small cracks. FRC is cement based composite material that has been developed in recent years. it's been with success used in construction with its glorious flexural – enduringness, resistance to ejection, impact resistance and glorious porousness and frost resistance. it's an efficient thanks to increase toughness, shock resistance and resistance to plastic shrinkage cracking of the mortar. These fibers have several benefits'.

A. Fibres Reinforced Concrete

The term Fiber Reinforced concrete (F.R.C) is outlined by ACI Committee 544 as a concrete made of hydraulic cements containing fine and coarse aggregates and discontinuous separate fibers. Inherently concrete is brittle underneath tensile loading. Mechanical properties of concrete will be improved by reinforcement with at random homeward short separate fibers, that forestall and control initiation, propagation and unification of cracks. Fiber Reinforcement is usually used to provide toughness and plasticity to brittle building material material. Reinforcement of concrete with one form of fiber could improve the required properties to a restricted level. Fiber concrete is that the form of concrete that contains Fibrous materials that increases its structural integrity.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VI June 2022- Available at www.ijraset.com

It contains short separate fibers that area unit uniformly distributed and at random homeward. Fibers embrace steel fibers, plastic fibers, glass fibers, natural fibers. at intervals these completely different fibers, that character of fiber concrete changes with varying concretes, fiber materials, geometrics, distribution, orientation and densities. In Fiber Reinforced Concrete, fibers may be effective in impressive cracks at each macro and small levels.

B. Back Ground of fibre Reinforced Concrete

Back ground of fibre concrete Portland cement concrete is taken into account to be a comparatively brittle material. once subjected to tensile stresses, non-reinforced concrete can crack and fail. Since middle 1800'ssteel reinforcing has been accustomed overcome this downside. As a composite system, there in forcing steel is assumed to carry all tensile masses. The problem with using steel in concrete is that over time steel corrodes because of the ingress of chloride ions. within the northeast, wherever common salt de-icing salts area unit usually used and a large amount of coastal space exists, chlorides area unit promptly out there for penetration into concrete to promote corrosion, that favors the formation of rust. Rust, features a volume between four to 10 times the iron, that dissolves to make it. the degree enlargement produces massive tensile stresses in the concrete, that initiates crack sand leads to concrete spalling from the surface.

Although some measures area unit out there to scale back corrosion of steel in concrete like corrosion inhibitive admixtures and coatings, a higher and permanent answer could also be replacing the steel with a reinforcement that's less environmentally sensitive. More recently small fibers, like those employed in ancient composite materials are introduced into the concrete mixture to extend its toughness, or ability to resist crack growth.FRC is Portland cement concrete strengthened with a lot of or less at random distributed fibers. In FRC, thousands of tiny fibers area unit distributed and distributed at random within the concrete during combining, and therefore improve concrete properties all told directions.

Fibers facilitate to boost the post peak plasticity performance, pre-crack enduringness, fatigue strength, impact strength and eliminate temperature and shrinkage cracks. Several differing types of fibers, each manmade and natural, are incorporated into concrete. Use of natural fibers in concrete precedes the appearance of standard strengthened concrete in historical context. However, the technical aspects of FRC systems remained essentially undeveloped.

Since the appearance of fiber reinforcing of concrete within the 1940's, a great deal of testing has been conducted on the varied fibrous materials to work out the particular characteristics and benefits for every product. many differing types of fibers are used to reinforce the cement-based matrices. the selection of fibers varies from artificial organic materials like plastic or carbon, artificial inorganic like steel or glass, natural organic like polysaccharide or sisal to natural inorganic amphibole. presently the industrial [illegible] = [illegible] merchandise [illegible] reinforced with steel, glass, polyester and plastic fibers. the choice of the sort of fibers is guided by the properties of the fibers like diameter, relative density, young’s modulus, enduringness etc. and also the extent these fibers have an effect on the properties of the cement matrix.

Types of fibers:
1) Steel fibre
2) Glass fibre
3) Synthetic fibre
4) Carbon fibre

C. Polyester Fibres Reinforced Concrete (P.R.C):

Polyester fibres square measure accessible in monofilament kind and belong to the thermoplastic polyester group. they're temperature sensitive and on top of traditional service temperature their properties might be altered. Polyester fibers square measure somewhat hydrophobic. Polyester fibers are used at low contents (1%) to regulate plastic shrinkage cracking in concrete.

D. Glass Fibres Reinforced Concrete (G.R.C):

Glass fiber is offered in continuous or shredded lengths. Fiber lengths of up to 35-mm area unit used in spray applications and 25-mm lengths area unit utilized in mixture applications. optical fiber has high tensile strength (2-4Gpa) and modulus (70-80Gpa) however has brittle stress-strain characteristics and low creep at temperature. Claims are created that up to five glass fiber by volume has been used with success in sand-cement mortar while not balling.

E. Effect of Fibres on Concrete:

1) Resistance to crack propagation due to plastic and drying shrinkage.
2) Increases ductility.
3) Increases compressive, Spilt tensile, flexural, and fatigue strength.
4) Increases impact and abrasion resistance.
5) Decreases permeability.

F. Objectives

1) To investigate the mechanical properties of concrete by adding polyester fibers in concrete mix.
2) To investigate the mechanical properties of concrete by adding alkali resistant glass fibers in concrete mix.
3) To find the optimum percentage of fiber content for polyester and alkali resistant glass fibers to be added in concrete in relation to their mechanical properties.
4) To determine the Strength variations with the use of polyester and alkaline resistant glass fibers in concrete.

II. LITERATURE REVIEW

This chapter discusses the literature back ground for the report and it includes of the topics, related to usage of various fibers and their behavior within the standard concrete. 2.1 result of victimisation fibers (glass, polyester, steel) on the strength properties of Concrete

Barbara G. Charalambidi. (2016) [1] Investigated on carbon-fiber-reinforced compound (CFRP) strengthened ferroconcrete (RC) beams of huge scale underneath fatigue loading. Reinforced concrete beams were forged for this purpose, each with rectangular and T cross-sections, with web dimensions of two hundred × five hundred millimeter and three, 050mmin length. Beams were reinforced in flexure with externally warranted CFRP laminate [externally warranted reinforcement (EBR)] or with CFRP laminates warranted into slits on the concrete cowl surface [near-surface-mounted (NSM)]. All specimens were tested underneath fatigue loading, with load-unload cycles of two rate frequency. Two different amplitudes of cycles were investigated.

Bilal S. Hamad, (2016) [2] Studied on the Bond Studies of High-Strength Concrete Joints Confined with Stirrups, Steel Fibers, or Fiber-Reinforced Compound Sheets. Resulted as crack patterns of all specimens were similar. the ultimate mode of failure of all specimens was spalling of the aspect cowl traditional to the plane of the hook because of the crushing of the concrete at the inner radius of the bend. • The results indicate the many and positive result of cross reinforcement confinement in rising the bond performance of HSC beam-column connections. For all 3 bar sizes tested, the addition of stirrups within the beam-column joint crossing.

PadmanabhanIyer. (2015) [3] Studied on Fiber-reinforced concrete (FRC) has become a viable new material utilized in varied constructions like building pavements, massive industrial floors, and runways. during this analysis, volcanic rock shredded fibers in filament type were accustomed develop Associate in Nursing FRC material referred to as volcanic rock. fiber-reinforced concrete (BFRC) to check the attainable improvement in the 28-day compressive strength and modulus of rupture, though the latter one is additional important for the development of pavements, industrial floors, and runways.

S.A Kanalli et al. (2014) [4] Investigated comparative study of compound fiber bolstered concrete with standard concrete. He conducted a preliminary study on compressive strength, tensile strength and flexural victimisation completely different proportions of polyprotein fibers resulted in a very varying quantitative relation of fiber indefinite quantity of 2.5 percent by volume of M20 grade concrete. Experimental studies show that most values of compressive split tensile and flexural strength of concrete are obtained at 0.75% fiber indefinite quantity.

C. Selinravikumar et al. (2013) [5] Investigated strength and fireplace resistant properties of glass fiber ferroconcrete. glass fiber has higher the advantage of getting higher enduringness and fireplace resisting properties, so reducing the loss of harm throughout fireplace accident of concrete structures. during this investigation glass fiber of 450mm length square measure intercalary to the concrete by volume fraction of up to a quarter to see its strength and fireplace resistant characteristics. Experiment studies shows increase in compressive split tensile and flexural strength of concrete by increasing share of fiber.

Pshtiwan N Shakos et al. [6] Studied use of glass fiber ferroconcrete in construction. In this study path take a look at for concrete with glass fiber and while not glass fiber square measure conducted to point differences in compressive strength and flexural strength by victimisation cubes of variable sizes. The experimental take a look at results indicate that the GFRC could be a tremendous different construction material.

Yogesh Iyer Murthy et al. [7] Studied performance of glass fiber ferroconcrete. In his investigation the compressive strength, flexural strength and workability of concrete containing varying proportions of glass fiber as replacement of fine mixture is studied. the rise in compressive strength is nominal whereas the flexural strength multiplied considerably of course with the rise in share of glass fiber. conjointly vital reduction in slump price is observed with increase in glass fiber content.

AvinashGornale et al. [8] Investigated strength aspects of glass fiber ferroconcrete. In his investigation he used glass fibers of zero.03% in M20, M30 and M40 Grade concrete.

It's been also discovered that there's gradual increase in early strength for Compression and Flexural strength of glass fiber ferroconcrete as compared to Plain Concrete, and there's fast increase in final strength for Split enduringness of glass fiber ferroconcrete as compared to Plain Concrete.

A.M Shendeet al. [9] Studied the strength properties of steel fiber ferroconcrete for M40Grade.Critical investigation for M-40 grade of concrete having combine proportion 1:1.43:3.04 with water cement quantitative relation 3.5 to check the compressive strength, flexural strength, split tensile strength of steel fiber ferroconcrete (SFRC) containing fibers of 1/3, 1%, 2% and 3% volume fraction of hook Stain Steel fibers of fifty, sixty and 67 ratios were used.

A result information obtained has been analyzed and compared with a sway specimen (0% fiber). A relationship between ratio vs. compressive strength, ratio vs. flexural strength, ratio vs. Split enduringness portrayed diagrammatically. Result information clearly shows share increase in 28 days' compressive strength, flexural strength and split enduringness for M-40 Grade of Concrete.

Indrajitpatelet al. [10] Investigated result of polyester fibers on engineering properties of high volume ash concrete. His work includes combine style for M25, M30, M35 and M40 grade HVFA concrete with completely different share of sophistication F ash 50,55 and 60%.

To improve the engineering properties viz. compressive, flexural, impact strength and abrasion resistance 12mm triangular shaped polyester is use at rates of 2.5% by the mass of building material material. The test results for compressive strength at 3,7,28 and 56 days for plain HVFA concrete for all grades with and while not meets codal demand. the utilization of polyester fibers has multiplied the compressive strength to order of twelve to fifteen nada. Flexural strength victimisation center purpose loading conjointly meets the desired parameters and fiber bolstered HVFA shows sixteen to twenty third increase compared to plain HVFA concrete at 28 and 56 days.

III. METHODOLOGY AND MATERIAL CHARACTERIZATION

In this chapter the tasks are presented in the sequential order in which they were performed with the help of flow chart.

A. Methodology

Experimental studies are carried out for determination of mechanical properties of concrete. Concrete mix is produced by mixing Cement, Fine aggregate, Coarse aggregate, Water, fibers (polyester, glass) and Super plasticizer in a definite proportion. The details of materials and their properties are discussed below.

B. Material Characterization

1) *Cement:* The cement used in this experimental work is 53 grade ordinary Portland cement.
2) *Fine Aggregate:* Locally available sand passed through 4.75mm IS sieve is used.
3) *Coarse Aggregate:* The aggregate used for this study was 10mm and 20mm single size coarse aggregates. The aggregate is collected from stone crushing unit near Ponduru located at a distance of 20 KM from Rajam.
4) *Water:* Potable water is used for experimentation.
5) *Fibers*

a) *Polyester Fiber:* The polyester fiber is produced from Reliance industries Ltd., Mumbai. The type of polyester fiber is CT 2024. The constant dosages of 1% fibers up to 4% are used by weight of cement. The length of fiber is 8mm and its diameter is 0.014mm.
b) *Glass Fiber:* The glass fiber is produced from Reliance industries Ltd., Mumbai. The constant dosages of 1% fibers up to 3% are used by weight of cement. The length of fiber is 8mm and its diameter is 0.07mm
c) *Admixture:* The High performance superplasticising admixture used is Fosroc Conplast SP430.

C. Tests on materials

Laboratory tests were conducted to know the properties of cement, fine aggregate and coarse aggregate and those are discussed below:

1) Tests on Cement

Cement used in the present project is of 53grade Ordinary Portland Cement. Various physical tests like specific gravity, fineness, normal consistency, initial & final setting time, soundness on cement as per IS 4031.

➢ *Specific Gravity*

- Specific gravity of cement used is 3.15.
- The specific gravity of cement as per IS requirements is in between 3-3.5.

➢ *Fineness of Cement*

- Fineness of cement is tested by sieving of cement.
- Fineness of cement is 93.5%.
- The residue of cement should not exceed 10% by mass as per IS 4031: 1968.

➢ *Normal Consistency (As Per IS 4031 part 4)*

- The standard consistency of a cement paste is defined as that consistency which will permit a Vicar's plunger to penetrate a depth of 5-7 mm from bottom of the mold.
- The percentage of water required to produce a cement paste of standard consistency is 27%.
- As per IS recommendations the standard consistency of cement should be in the range of 26% -33%.

➢ *Initial Setting Time (As Per IS 4031 part 5)*

- The time elapsed between the moment water is added to cement to the time that paste starts losing its plasticity is called initial setting time.
- The initial setting time of the cement used is 40 minutes.
- As per IS recommendations initial setting time being greater than 30 minutes.

➢ *Final Setting Time (As Per IS 4031 part 5)*

- The time elapsed between the moment of adding water to the cement, and the time when the paste has completely lost its plasticity is called final setting time.
- The final setting time of cement is 6 hours 32minutes.
- As per IS recommendations final setting time should be within 10 hours.

➢ *Soundness Test (As Per IS 4031 part 3)*

- Soundness test of cement was done by using lechatlier apparatus.
- Soundness test of cement: 3mm (not greater than 10mm).

2) Tests on Fine Aggregate

Specific gravity of fine aggregate is 2.74 and sieve analysis was conducted to the fine aggregate which shows the sand belong to zone III as per IS: 383-1917.

S no.	IS sieve No	Particle size	Wt. retained	% retained	Cumulative % retained	% finer	Passing	% passing	zone3
1	4.75	4.75	2	0.4	0.5	99.8	498	99.6	90-100
2	2.36	2.36	4	0.8	1.2	98.8	494	98.8	85-100
3	1.18	1.18	26	5.2	6.4	93.6	468	93.6	75-100
4	0.6	0.6	84	16.8	23.2	76.6	383	76.7	60-79
5	0.3	0.3	336	67.2	90.4	9.6	44	8.8	12 - 40
6	0.15	0.15	44	8.8	99.3	0.7	4	0.8	0-10
7	0.075	0.075	4	0.8	100	0	0	0	
8	PAN	0	0	0	100	0	0	0	

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VI June 2022- Available at www.ijraset.com

Table: Grain size analysis of sand

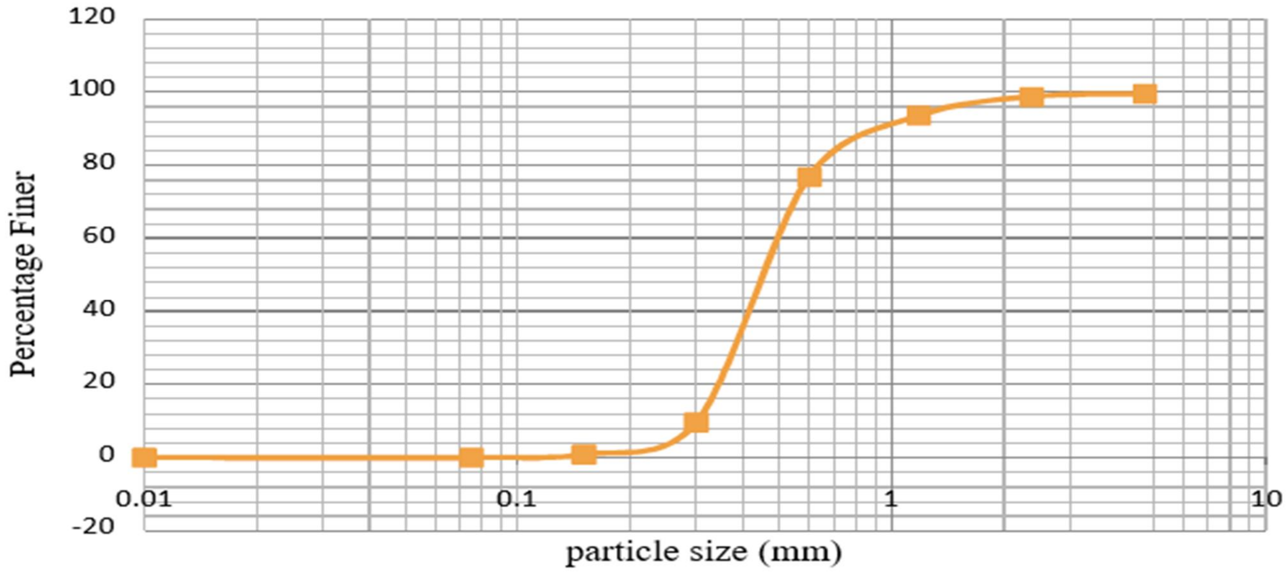


Figure: Grain size analysis of sand

- *Tests on Coarse Aggregate*

Aggregates used in the mix were 20 mm and 10mm respectively.

Size	Specific gravity
20mm	2.71
10mm	2.51

Table: Specific Gravity of aggregates.

- *Aggregate Impact value*

- Average impact value of aggregate sample = 19.49% Aggregate crushing value
- Average crushing value of aggregate sample = 26.20%

IV. PREPARATION OF SAMPLES AND EXPERIMENTAL SETUP

This chapter deals with preparation of Mix design to cast the samples and experimental methodology for carrying out compressive, split tensile and flexural strength of concrete samples. 3 different types of concrete mixes were prepared (C.C, P.R.C and G.R.C) and 216 samples are casted for different fiber dosages.

A. Mix Design

All the concrete mixes in the project are prepared as per IS: 10262-2009.This standard was first prepared in the year 1982 and later revised in the year 2009. This Indian standard was adopted by the Bureau of Indian standards, after the draft finalized by the cement and the concrete sectional committee has been approved by the civil engineering division council. The following prerequisites are to be taken into consideration before designing a concrete mix: a) Characteristic compressive strength of concrete at 28 days (fck), b) Degree of workability desired, c) Limitations on the water cement ratio and the minimum cement content to ensure adequate Durability. d) Type and maximum size of aggregate to be used, e) Standard deviation(s) of compressive strength of concrete.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VI June 2022- Available at www.ijraset.com

➢ *Mix Design*

Grade designationType	_	M30
of cement		OPC 53 grade conforming to IS 8112
Max. Nominal size of aggregate	_	20mm
Minimum cement content	_	300 kg/m^3 (IS-456:2000)
Maximum water cement ratio	_	0.45
Exposure condition	_	moderate
Slump	_	100mm

➢ *Target strength for mix proportioning*

$F^1_{ck} = F_{ck} + 1.65*S$ (S=5 for M_{30} grade concrete)

$= 30 + (5 X 1.65) = 38.25 N/mm^2$

➢ *Selection of water cement ratio*

From table 5 of IS 456:2000, Max. water cement ratio = 0.45Based on trails adopt water cement ratio as = 0.45

As superplasticizer is used, the water content can be reduced up 20 percent and above.

Based on trials with superplasticizer water content reduction of 21 percent has been achieved.Hence, the arrived water content = 197 x 0.79 = 155 lite

➢ *Calculation of cement content*

Water-cement ratio= 0.5

Cement content=155/0.5 = 310 kg/m^3

From Table 5 of IS 456, minimum cement content for moderate exposure condition = 300 kg/m3 312 kg/m3 > 300 kg/m3, hence, O.K.

From table 3 of IS 10262:2009, vol. of course aggregate corresponding to 20mm size aggregateand fine aggregate (Zone-III) = 0.64

For water cement ratio of 0.5 = Corrected proportion of Vol. of course aggregate for watercement ratio of 0.5 = 0.64

➢ *Mix Calculation*

a) Vol. of concrete = $1m^3$

b) Vol. of cement = (mass of cement/specific gravity of cement)*(1/1000)
= $0.09841m^3$

c) Vol. of water = (mass of water/specific gravity of water)*(1/1000)
= $0.155m^3$

d) Vol. of chemical admixture (super plasticizer)

$= \frac{mass\ of\ admixture\ specific\ gravity\ of\ admixture}{} * \frac{1}{}$

= $0.0019m^3$

e) Vol. of all in aggregate (e) = [a-(b+c+d)]
= $0.74469m^3$

Mass of coarse aggregate = e* vol. of course aggregate* sp. Gr. of course agg.*1000
= $1305.88kg/m^3$

f) Mass of fine aggregate = e* vol. of course aggregate* sp. Gr. of fine agg.*1000
= 34.566 kg/m^3

M30 *Ratio is* **1:2.36:4.212;**

Mix-proportions

Cement	= 310kg/m^3
Water	= 155 liters
Fine aggregate	= 734.5622 kg/m^3
Coarse aggregate	= 1305.88 kg/m^3
Chemical admixture	= 2.17 kg/m^3
Water-cement ratio	= 0.5

Mix designation	Description of Mix
Conventional concrete	C.C
PRC 0.1%	C.C+0.1%P.F
PRC 0.2%	C.C+0.2%P.F
PRC 0.3%	C.C+0.3%P.F
PRC 0.4%	C.C+0.4%P.F
GRC 0.1%	C.C+0.1%G.F
GRC 0.2%	C.C+0.2%G.F
GRC 0.3%	C.C+0.3%G.F

Table 4.1 Description of Concrete mix

Description of mix	Mix proportion				
	Cement	Fine aggregate	Coarse aggregate	Super plasticizer	fibers
C.C	1	1.58	2.62	0.007	-
C.C+0.1% (fibers)	1	1.58	2.62	0.007	0.001
C.C+0.2% (fibers)	1	1.58	2.62	0.007	0.002
C.C+0.3% (fibers)	1	1.58	2.62	0.007	0.003
C.C+0.4% (fibers)	1	1.58	2.62	0.007	0.004

Table 4.2 Proportion of the concrete with and without fibers

B. Preparation of Samples

In order to determine the mechanical characteristics such as compressive, split tensile and flexural strengths first of all 216 samples are prepared. Later they were tested on Compressive testing machine and UTM. The compressive, split tensile and flexural strengths has been determined for different fiber fraction from laboratory testing of cubes, cylinders and beams. The results of the tests conducted on various fiber percentage of concrete are presented. The compressive strengths of concrete have been evaluated by testing cubes of size 150mmx150mmx150mm. The Split Tensile Strength of concrete have been evaluated by testing cylindrical specimens of size 30cm length and 15 cm diameter, the flexural strength of concrete has been evaluated by testing prisms of dimension 150mmx100mmx100mm.After casting of these specimens these are kept in molds for 24hours at a temperature of 27 ± 2 degree Celsius. After 24 hours these are removed from the molds and are put into curing tank and tested for 3,7,28 days respectively.

C. Experimental Setup

The prepared samples as mentioned in the previous section and the testing methodology for compression, split tensile and flexural strengths are followed according to the IS: 516:1959 and they are explained below.

V. PRESENTATION OF RESULTS AND DISCUSSIONS

A. Workability of Concrete

Slump cone test was performed to determine the slump of the concrete mixes. The slump values for various mixes as shown in below table

% of Polyester fibers	Slump (mm)
0	113
0.1	105
0.2	97
0.3	85
0.4	76

Table 5.1 Slump values for different % of polyester fibers

% of Glass fibers	Slump (mm)
0	113
0.1	102
0.2	91
0.3	78

Table 5.2 Slump values for different % of Glass fibers

It is observed that from the above results as the percentage of fibers increases the slump of the concrete is decreasing. This may be due to the fibers, as the percentage of fiber increases they obstructing the flow of the concrete.

B. 5.2 Mechanical Characteristics of P.R.C (Polyester fiber Reinforced concrete):

1) Compressive Strength of P.R.C cube specimens

Compressive Strength of P.R.C cube specimens

Concrete Mix	3 days(MPa)	7 days(MPa)	28 days(MPa)
C.C	10.23	20.12	33.25
PRC (0.1%)	10.81	21.22	37.91
PRC (0.2%)	11.18	22.31	39.00
PRC (0.3%)	12.23	24.01	40.19
PRC (0.4%)	11.75	23.12	38.25

Table Compressive Strengths of P.R.C cube specimens

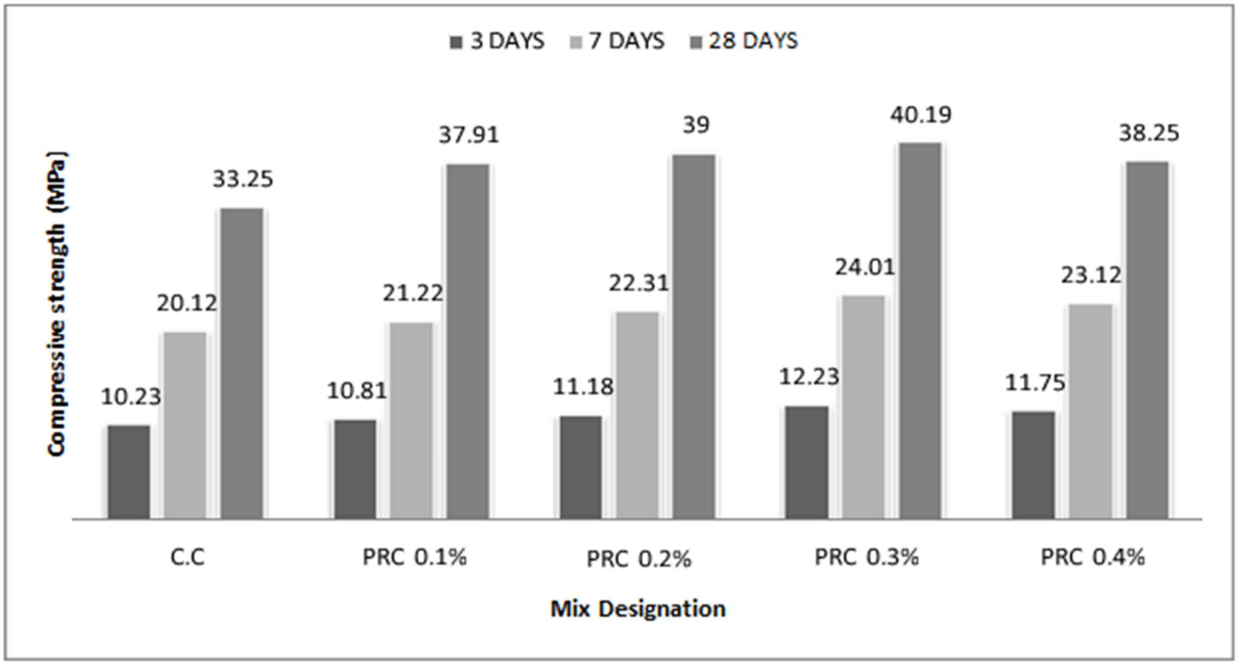


Figure Compressive strength values of C.C and P.R.C at 3, 7 and 28 Days

2) Split Tensile Strength P.R.C cylinder Specimens

Concrete Mix	3 days(MPa)	7 days(MPa)	28 days(MPa)
C.C	1.00	2.17	3.16
PRC (0.1%)	1.08	2.44	3.52
PRC (0.2%)	1.11	2.61	3.74
PRC (0.3%)	1.26	2.99	4.02
PRC (0.4%)	1.14	2.80	3.80

Tensile Strengths of P.R.C Cylindrical specimens

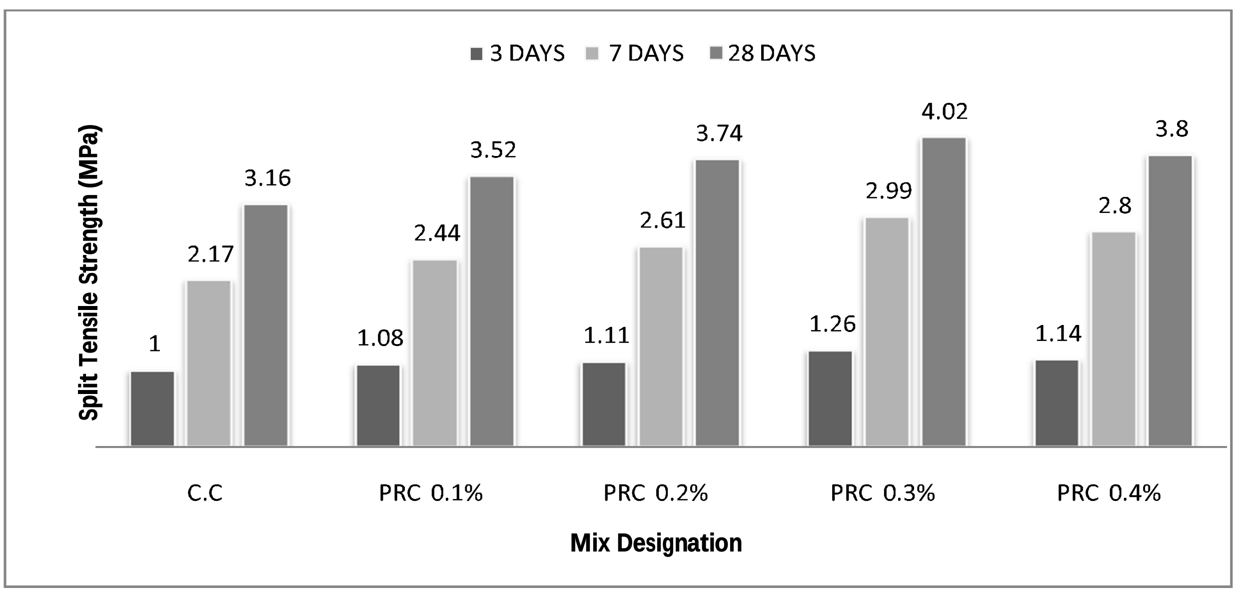


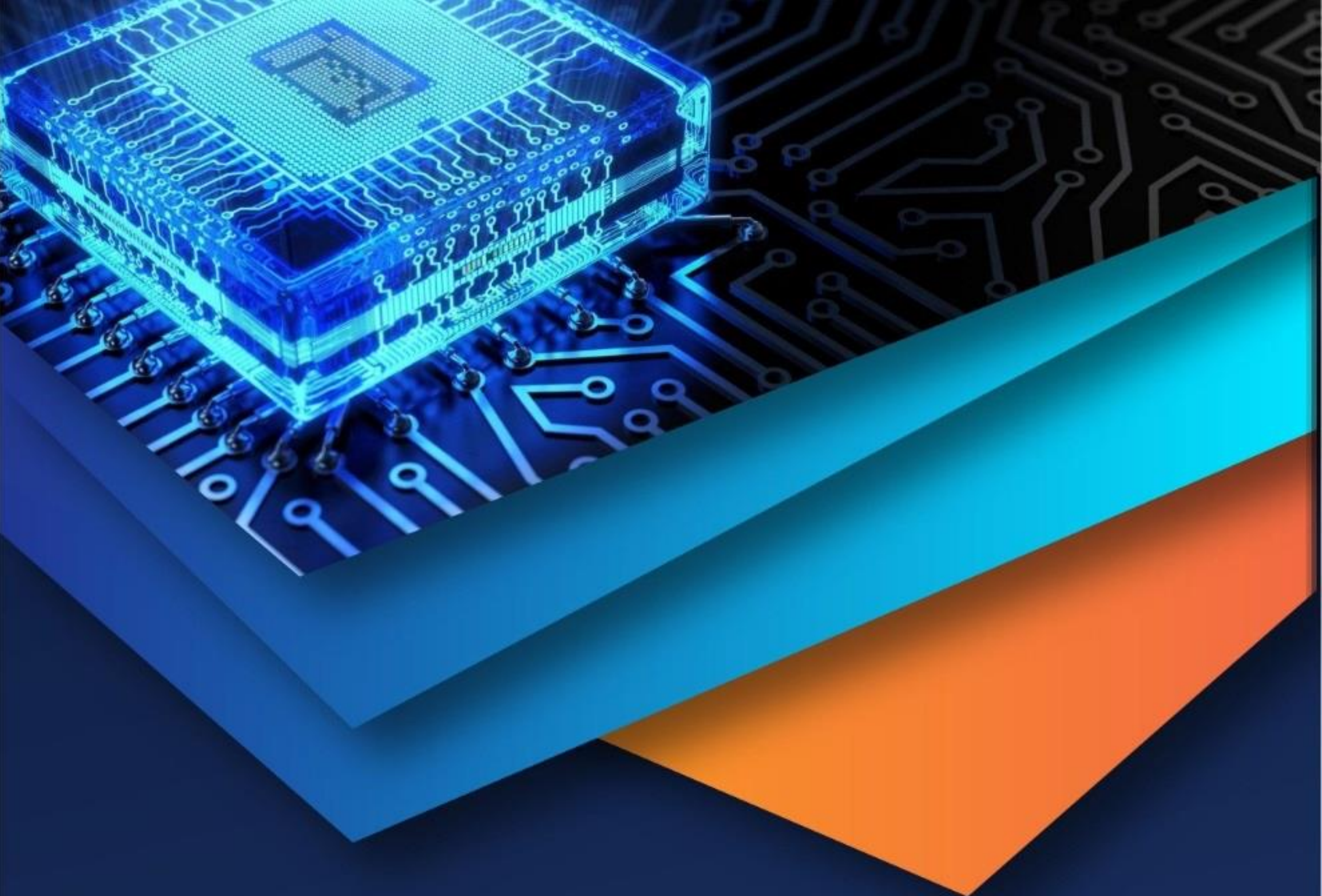
Figure Split Tensile strength values of C.C and P.R.C at 3, 7 and 28 Day

VI. CONCLUSIONS

As given in chapter-4 and mentioned in chapter -5 2 form of fibers area unit used for casting samples and that they area unit tested for compressive, split tensile and flexural strengths with varied percentages. From the tests conducted on varied samples and results obtained, the subsequent conclusions area unit drawn: 1. it's discovered that Slump values of the concrete area unit decreasing because the fiber proportion increasing. The reduction in slump with the rise within the fiber are going to be attributed to presence of fibers that causes obstruction to the free flow of concrete. 2. Compressive Strength improvement ranges from fourteen. 1% to 20.00% in comparison of fiber increases from 1% to 3% for P.R.C in comparison to the standard concrete at 28 days. 3% is discovered because the optimum worth. 3. Split lastingness improvement ranges from 21.04 % to 27.21% in comparison of fiber increases from zero.1% to 0.3% for P.R.C in comparison to the standard concrete at 28 days. 3% is discovered because the optimum worth 4. Flexural Strength improvement ranges from 32.89% to 53.78% in comparison of fibers increases from 1% to 3% for P.R.C in comparison to the standard concrete at 28 days. 3% is discovered because the optimum worth. 5. Compressive Strength improvement ranges from 22.25% to 36.45% in comparison of fiber increases from 1% to 2% for G.R.C in comparison to the standard concrete at 28 days. 6. because the fiber content is augmented from 1% to 2% in weight of cement there's associate increase within the split lastingness from 24.05% to 31.6% for G.R.C . when compared to the conventional concrete at 28 days. 7. At the age of 28 days, there's a big improvement within the flexural strength with the addition of fibers. The increment within the flexural strength of G.R.C is from 26.78% to 31.59% in comparison of fibers varied from 1% to 2% severally. 2% is discovered because the optimum worth. Construction value per money supply is augmented by 9.9% by exploitation polyester and a rise of 10.44% by exploitation glass fiber. because the value will increase on addition of fibers in concrete increases in strength (compressive, split tensile and flexural strengths) of the concrete which results in increase in crack resistance, modulus of elasticity, durability, fatigue, resistance to impact and abrasion. It decreases the upkeep value and improves the future serviceability of the structure. 9. the upper initial value by nine to 11 November is balanced by the reduction in maintenance and rehabilitation operations by exploitation Fiber concrete. 10. This study was to attain the best compressive, split tensile, flexural strength and to observe however these parameters modified with the variation of some factors like water to cement quantitative relation are going to be decreased as a result of low permeableness and shrinkage reduction in concrete. However, additional economical approach may be achieved by improvement in strength (compressive, split tensile and flexural strengths) that results in improvement in serviceability of structures.

VII. SCOPE OF FUTURE IMPROVEMENT

The present data indicates that there is significant improvement in the strength properties of the Concrete by using polyester and glass fibers. Further study can be extended to know the mechanical properties of fiber reinforced concrete by adding combination of fibers (Hybridization). We can also study different parameters like frost resistance, fatigue life, drying shrinkage, abrasion resistance, permeability and porosity of the concrete with and without fibers. In order to make the study more economical we can replace cement with fly ash. Studies can be made when the mixes are exposed to high temperatures.



10.22214/IJRASET

INDEX COPERNICUS 45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY