

**COMPARE THE BEHAVIOUR OF CONCRETE WITH BASALT FIBER AND
POLY VINYL ALCOHOL FIBER USING GLASS POWDER AS
REPLACEMENT OF FINE AGGREGATE WITH CONVENTIONAL
CONCRETE**

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in
Civil Engineering

By

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**DEPARTMENT OF CIVIL ENGINEERING
SCHOOL OF BUILDING AND ENVIRONMENT**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade "A" by NAAC
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of GINNI PAVAN KALYAN (Reg No. 39200032) and UPPADA SHYAMANTH REDDY (Reg No. 39200041) who carried out the project entitled "**COMPARE THE BEHAVIOUR OF CONCRETE WITH BASALT FIBER AND POLY VINYL ALCOHOL FIBER USING GLASS POWDER AS REPLACEMENT OF FINE AGGREGATE WITH CONVENTIONAL CONCRETE**" under our supervision from September 2022 to April 2023.

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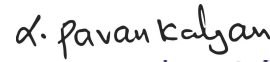
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DECLARATION

We GINNI PAVAN KALYAN (Reg. No. 39200032) and UPPADA SHYAMANTH REDDY (Reg. No. 39200041) hereby declare that the Project Report entitled **“COMPARE THE BEHAVIOUR OF CONCRETE WITH BASALT FIBER AND POLY VINYL ALCOHOL FIBER USING GLASS POWDER AS REPLACEMENT OF FINE AGGREGATE WITH CONVENTIONAL CONCRETE”** done by us under the guidance of Mrs. B. PRIYADHARSHINI is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Civil Engineering.

DATE: 13.04.2023

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SIGNATURE OF THE CANDIDATES

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ABSTARCT

In recent years the construction industry has increasingly embraced the use of alternative materials to reduce the impact on the environment and mitigate pollution effects. one such material is glass powder, which can be used as a partial replacement for fine aggregate in concrete. Another trend is the use of basalt fiber, in particular, has gained popularity due to its eco-friendly manufacturing process and excellent mechanical properties. Although relatively new in the construction industry, basalt fibers are cheaper than other fibers and have been studied by researchers for their effect on compressive strength, flexural strength, and splitting tensile strength of fiber concrete. Similarly, poly vinyl alcohol fiber is a suitable polymeric fiber for use in concrete and has unique microstructure characteristics that present challenges in material design. In this project, the effect of adding basalt fiber and poly vinyl alcohol fiber on the compressive strength, flexural strength, and splitting tensile strength of fiber concrete was studied. Different volumes of fibers were added to the concrete and compared with conventional concrete. The results of the experiment showed that the addition of up to 0.3% volume of basalt fiber and poly vinyl alcohol fiber individually improved the compressive and flexural strength of the concrete. However, there was negligible influence of fiber addition on the splitting tensile strength. Basalt fiber and poly vinyl alcohol fiber could be utilized in concrete to improve its mechanical properties, and the test results showed that poly viny alcohol fiber had a higher splitting tensile strength and flexural strength than basalt fiber in the corresponding mix proportion. Overall, the study demonstrated the potential of alternative materials such as basalt fiber and poly vinyl alcohol fiber to improve the sustainability and strength of construction materials.

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LIST OF SYMBOLS AND ABBREVIATIONS

ACRONYMS	EXPANSIONS
ACI	AMERICAN CONCRETE INSTITUTE
BFRC	BASALT FIBER REINFORCED CONCRETE
BSF	BASALT FIBER
GA	GLASS AGGREGATE
GP	GLASS POWDER
HFRC	HIGHLY FIBERED REINFORCED CONCRETE
IS	INDIAN STANDARDS
KG	KILOGRAM
Kg/m ³	KILOGRAM PER CUBIC METER
LIT	LITRES
mm	MILLIMETER
MPa	MEGA PASCAL
OPC	ORDINARY PORTLAND CEMENT
PVA	POLY VINYL ALCOHOL
SEM	SCANNING ELECTRON MICROSCOPE
SFRC	STEEL FIBER REINFORCED CONCRETE
WG	WASTE GLASS
f_c	COMPRESSIVE STRENGTH
f_t	SPLITTING TENSILE STRENGTH
f_{cr}	FLEXURAL STRENGTH
C	CELSIUS
0	DEGREE

μ

MICRON

%

PERCENTAGE

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CHAPTER 1

INTRODUCTION

1.1. GENERAL

Concrete is one of the most widely used building materials in the construction industry. It is typically composed of cement, sand, water, and coarse aggregates, with the proportions varying depending on the specific application. However, the production of concrete requires large amounts of natural resources, which can have negative environmental impacts. One potential solution to this issue is to use replacement aggregates, which are recycled or waste materials that can partially or fully replace traditional aggregates in concrete production.

The key ingredient in concrete is cement, which is made by heating limestone and other materials to high temperatures in a kiln, producing a powder that reacts with water to form a paste. The paste is then combined with aggregates, such as sand and gravel, and water, which causes the mixture to harden and form a solid structure.

The properties of concrete can be customized to meet specific requirements, such as strength, durability, workability, and appearance. Various additives, such as fly ash, slag, and silica fume, can be used to improve the properties of concrete, such as its resistance to freeze-thaw cycles, chemical attacks, and fire.

The performance of concrete depends on various factors, such as the quality of materials, proportioning of ingredients, mixing process, and curing conditions. Therefore, proper design, construction, and maintenance are essential to ensure the desired properties and longevity of concrete structures.

1.2. PARTIAL REPLACEMENT AGGREGATES

One such material is the replacement aggregate, which can be derived from industrial waste products or recycled materials. The use of replacement aggregates as partial replacements for fine aggregates has several potential benefits, including

reducing the environmental impact of concrete production, conserving natural resources, and improving the durability and strength of concrete.

The performance of concrete with replacement aggregates depends on various factors, such as the type and properties of the replacement material, its proportion in the mix, and the curing conditions. Therefore, careful selection and optimization of replacement aggregates are crucial to ensure the desired properties of the final product.

There are various materials that can be used as partial replacements for aggregates in concrete, each with its unique properties and advantages. Here are some common types of partial replacement aggregates used in concrete:

1. Fly Ash: Fly ash is a byproduct of coal combustion that can be used as a partial replacement for cement or fine aggregates. It is known for its ability to improve workability, reduce bleeding and segregation, and enhance the long-term strength and durability of concrete.
2. Ground Granulated Blast Furnace Slag (GGBFS): GGBFS is a byproduct of iron production that can be used as a partial replacement for cement or fine aggregates. It is known for its ability to improve workability, reduce permeability, increase resistance to chemical attacks and sulfate attacks, and enhance the long-term strength and durability of concrete.
3. Silica Fume: Silica fume is a byproduct of silicon production that can be used as a partial replacement for cement or fine aggregates. It is known for its ability to improve compressive strength, reduce permeability, increase resistance to chemical attacks and sulfate attacks, and enhance the long-term durability of concrete.
4. Recycled Concrete Aggregate (RCA): RCA is made from recycled concrete and can be used as a partial replacement for coarse aggregates. It is known for its ability to reduce the environmental impact of concrete production, conserve natural resources, and enhance the long-term strength and durability of concrete.

5. Glass Aggregate: Glass aggregate is made from recycled glass and can be used as a partial replacement for coarse aggregates. It is known for its ability to reduce the environmental impact of concrete production, conserve natural resources, and enhance the aesthetic appearance of concrete.

There are various types of partial replacement aggregates that can be used in concrete, each with its unique properties and benefits. The selection of the most suitable replacement aggregate depends on the specific application and desired properties of the final product.

1.3. FIBERS IN CONCRETE

Fiber Reinforced Concrete is a composite material comprising cement, mortar or concrete, and dispersed discontinuous fibers that possess specific characteristics. There are several types and properties of fiber reinforced concrete with numerous benefits. Discrete fibers are small pieces of reinforcing material, and continuous meshes, woven fabrics, and long wires or rods are not classified as such. Fiber-reinforced concrete (FRC) is a type of concrete that is strengthened by the addition of fibrous materials. The fibers in FRC are short, discrete, and uniformly dispersed throughout the concrete mix in a random orientation, enhancing its structural integrity. Fiber-reinforced concrete can be made using steel fibers, glass fibers, synthetic fibers, and natural fibers, among others. The properties of the resulting concrete can vary depending on the type of concrete, fiber material, geometry, distribution, orientation, and density. Fiber-reinforcement is commonly used in shotcrete applications, but it can also be used in normal concrete. Fiber-reinforced normal concrete is typically used for on-ground floors and pavements, but it can also be suitable for other construction parts, such as beams, piers, and foundations, either on its own or in combination with hand-tied rebars. Using fibers (usually steel, glass, or plastic) to reinforce concrete is less expensive than using hand-tied rebars, while still significantly increasing the tensile strength of the concrete. The shape, dimension, and length of the fibers used also play a crucial role in determining the properties of the final product. If the amount of fiber used in concrete is limited, there may be improvements in its mechanical properties characteristics.

CHAPTER 2

LITERATURE SURVEY

2.1 GENERAL

The following major research project has been taken from both national and international journals as reference to analyze the concepts for the project.

2.2 REVIEW OF THE LITERATURES

Khan and Sarker (2023) on the basis of present experimental study, the following conclusions are drawn. one critical property that glass aggregate exhibits is its significantly lower water absorption compared to most naturally occurring sand which affects the fresh, mechanical, and durability properties of concrete from the results of the water absorption test of sand and glass powder.

Carvalho et al. (2022) States that the development of natural fibers and future trends, and the main issue they highlighted is how to obtain the appropriate fiber admixture to obtain excellent mechanical properties. Basalt fiber made from volcanic rocks after the melting process can be mixed into concrete.

Borhan et al. (2022) States that the properties of GA to produce concrete reinforced with chopped basalt fiber. Fine aggregate was replaced by the recycled mixed colour glass at different replacement levels (20%, 40%, and 60% by total weight) with various replacement levels of fiber (0%, 0.1%, 0.3%, and 0.5%).

Yin.et.al. (2022) states that He conducted the Substantial experimental studies on both plain concrete and steel fiber reinforced concrete (SFRC). The material properties and mechanical behavior of both plain concrete and SFRC has been developed by highly concerned and numerous investigations. An experimental study has been performed on the strength and stress-strain relations of SFRC under multi axial stress state.

Dias and Thaumaturgo, (2021) states that the addition of 1.0% basalt fiber by volume reduced the compressive and tensile splitting strength of concrete by 26.4% and 12%, respectively.

Chensong dong (2021) states that an optimization study on carbon/S-glass hybrid composite pipes under flexural loading and he obtained the less failure load track in the middle range of S-glass fiber covered with carbon fiber hybrid composite pipe also gives the best hybrid combination with minimum cost and weight reduction.

Niu et al (2020) States that the working performance of basalt fiber reinforced concrete and they found that the addition of short-cut basalt fiber can significantly reduce the fluidity of concrete mixture, and the fiber agglomeration phenomenon is serious with the increase of the content. It is concluded based on different experimental techniques to investigate these effects, such as slump tests, rheological measurements, and microscopy analysis.

Zhang and shan (2020) states that Basalt fibres are 100% corrosion resistant. This is due to the chemical composition of basalt fibers, which are made from volcanic rock and are therefore naturally resistant to chemical attack.

Kabay et al. (2018) States that the influence of basalt fiber on the mechanical properties of concrete with 0%~2% fiber volume fraction, and the results showed that the compressive strength of concrete decreased with the addition of fiber.

M.Olofinnade (2018) States that the optimum glass content in concrete should be of 25% can lead to improved mechanical properties, such as compressive strength, flexural strength, and impact resistance. This recommendation is based on the results of their experimental study, which investigated the effects of incorporating waste glass powder as a partial replacement for cement in concrete. And also, different types of percentages of glass powder are 0%, 10%,15%and 25% etc. are used as replacement aggregate. It is important to note that the optimal glass content in concrete can depend on several factors, such as the type of glass used, the specific application of the concrete, and the environmental conditions it will be exposed to.

Ali et.al., (2017) States that Similar results of reduced flexural, splitting tensile and compressive strengths using waste glass powder. Their study investigated the effects of incorporating waste glass powder at various levels (up to 20% by weight) on the mechanical properties of concrete.

Larrinaga et al., (2016) States that Compared to carbon fiber, basalt fiber is cheaper and similar to manufacture. Compare to glass fiber, the mechanical performance is similar or even better. This is based on a number of factors, including the fiber's tensile strength, modulus of elasticity, and strain-to-failure ratio.

Almusallam.et.al. (2016) states that He investigated on the fracture behavior of HFRC by using three types of fibers namely steel, Kevlar and polypropylene fiber. Based on the results, analytical models were developed using an inverse analysis to predict the tension softening diagram of HFRC. The author suggests that the use of different types and amounts of fibers can have a significant impact on the fracture behavior of HFRC, and that analytical models can be used to predict and optimize the properties of the resulting composite material.

Pajak.et.al. (2016) states that He conducted research on the flexural properties of steel-polypropylene HFRC. Results has been showed that steel fibers play the most important role in the enhancement of mechanical properties, and polypropylene fibers only slightly improve the toughness of concrete.

Blunt.et.al. (2015) states that He conducted studies on corrosion resistance of hybrid FRC. It has been shown that the hybridization of fibers was an effective way to delay the corrosion initiation and reduce the corrosion rate by increasing resistance to cracking. The authors conclude that the combination of fibers, such as steel and polypropylene fibers, provided a synergistic effect that improved the overall performance of the composite material. The hybridization of fibers also led to increased resistance to cracking, which further enhanced the corrosion resistance of the FRC.

Iqbal.et.al. (2015) states that He improved the splitting tensile strength, flexural strength and flexural toughness of the concrete has been increased by the volume

fraction of steel fibers in high strength light weight self-compacting concrete (HSLSCC) resulted in reduction of compressive strength.

Prisco.et.al. (2015) states that He recognized the strength and ductility of concrete is partially improved by inclusion of only single steel fiber (SF) or single polypropylene fiber (PF). It has been concluded that the optimization of mechanical performance of concrete was recently acknowledged by combination of different types of fibers. The results showed that the addition of a combination of fibers, rather than a single type of fiber, led to improved performance in terms of strength and ductility.

Fiore et al (2015) States that Basalt fiber has excellent modulus, high strength and temperature resistance, non-toxic, natural, stable, easy to process, eco-friendly, and relatively cheap. Compared to other high-performance fibers, such as carbon or glass fibers, basalt fibers are relatively cheaper, which can make them more accessible for a wider range of applications. Overall, these properties make basalt fiber a promising material for use in various industries, including construction, aerospace, and automotive, among others.

Abdallah and Fan (2014) On the basis of present experimental study, the following conclusions had been drawn. The properties of concrete comprising finer crushed glass used as fine aggregate in the best ratio to achieve the highest compressive strength of concrete blocks, and the influence of GA replacement level on the expansion rate resulted from the Alkali-silica reaction (ASR).

Zhu et al., (2014) States that A very big advantage of basalt fibers reinforced polymer reinforcement is the possibility of using it at high temperatures, up to 1650°C. This is due to the high-temperature resistance of basalt fibers, which can withstand much higher temperatures than traditional reinforcement materials such as steel or glass fiber.

Abdulhadi (2014) states that the effect of Basalt and Polypropylene Fibers with different volumes and concluded that the compressive strength for concrete from two different type of fiber at different volume fraction shows different degree of reduction.

The addition of 0.3%, 0.6%, 0.9% and 1.2% resulted in a decrease of compressive strength relative to plain concrete by 9%, 19%, 1%, and 18% respectively.

Jiang et al. (2014) states that as compared with the plain concrete, concrete reinforced with Basalt fibers have high flexural strength and tensile strength. But the compressive strength of concrete reinforced by Basalt fibers increases slightly at the early age and even decreases at the late age. At early age it increases up to 6.5% and at late age it decreases up to 1.5%, it varies with their optimum values of usage of fibers.

George et al. (2014) states that, the basalt fiber inclusion enhanced the split tensile and flexural strength of concrete. Through the SEM (Scanning Electron Microscope) analysis, it is confirmed that the rod like structure of basalt fiber observed at the interface of cementitious and aggregate reason for the increased split tensile and flexural strength of concrete, as it bridges or connects the weak and strong matrix upon loading.

Smriti et al. (2014) states that for incorporating basalt fiber into composite mix, there is decrease in workability and increase in density as volume fraction of fiber increases. Experimental results showed increase in compressive strength for basalt fiber reinforced composite the authors found that the addition of basalt fibers led to an increase in compressive strength of the composite material. This is likely due to the high stiffness and strength of basalt fibers, which can reinforce the composite matrix and improve its load-bearing capacity.

Irine (2014) states that the workability of concrete decreases with the addition of Basalt Fibers. But this difficulty can be overcome by using plasticizers or superplasticizers. The percentage increase of compressive strength of basalt fiber concrete mix compared with 28 days compressive strength of Plain Concrete is observed as 14%. The percentage increase of split tensile strength of basalt fiber concrete mix compared with 28 days compressive strength of Plain Concrete is observed as 62%. The flexural strength of basalt fiber concrete is also found have a maximum increase of 54% at 4kg/m³ of fiber content.

Carsana et al. (2014) States that She reported that the long term pozzolanic activity of glass powder, up to 7 years, was superior to natural pozzolans and similar to fly ash. The study states that glass powder can be an effective pozzolanic material for use in concrete, particularly in applications where long-term durability and strength are critical. The authors highlight the potential for this approach to improve the sustainability of concrete production by reducing the need for cement and utilizing waste materials.

Yap.et.al. (2014) states that He studied the flexural toughness of steel-polypropylene hybrid fiber reinforced oil palm shell concrete. Research has been concluded that the dominance of steel fibers on the first crack deflection and toughness of concrete was evident in the hybrid system. The mix with 0.9% of steel and 0.1% of PP hybrid fibres reported the highest improvement in toughness index and residual strength factor. The study concluded that the use of a hybrid system consisting of both steel and polypropylene fibers can result in improved flexural toughness and first crack deflection of concrete.

Adaway and Wang (2013) states that concrete containing 15% crushed WG acquired a fresh density more than that of the reference concrete, whereas all other crushed WG samples with replacement levels of more than 15% achieved lower density than the reference concrete. The increase replacement fine aggregate by the WG resulted in decreasing the density of concrete.

Krassowska and Lapko (2013) states that the test results of models of BFRC beams showed a distinct increase in flexural and shear capacity as compared to the beams without fibers. The study suggests that the use of basalt fibers in concrete can improve the mechanical properties of the resulting composite material, particularly in terms of its flexural and shear capacity.

Tumadhir (2012) states that the possibility of use chopped basalt fiber to improve the mechanical properties of glass aggregate concrete using a combined method of statistical analysis and tests. It was found that using basalt fiber improved all mixes with the presence of an optimal fiber content in each ratio of glass which gave more strength.

Matos and Sousa-Coutinho (2012) states that They examined the durability characteristics of mortar with cement substituted by glass powder by 10% and 20% and found that water sportively was not affected and carbonation resistance decreased with glass powder inclusion, while the chloride diffusion was lowered. This is due to the pozzolanic reaction of the glass powder, which leads to the formation of calcium silicate hydrate (C-S-H) gel. The C-S-H gel fills the pores in the mortar, thus reducing the permeability of the material and limiting the ingress of chlorides.

Schwarz et al. (2008) States that He investigated the durability characteristics of concrete containing 10% glass powder as cement replacement and revealed that the chloride ingress and water intake were both reduced. However, its compressive strength was lower than plain cement concrete at each testing age up to 90 days. This concludes that the use of glass powder as cement replacement may result in a decrease in the early strength of concrete.

2.3 INFERENCE FROM LITERATURES

The following are the inferences that are noted from the above literature reviews

- I. Fine aggregate was replaced by the recycled mixed colour glass at different replacement levels (20%, 40%, and 60% by total weight) with various replacement levels of fiber (0%, 0.1%, 0.3%, and 0.5%).
- II. Basalt fibres are 100% corrosion resistant. This is due to the chemical composition of basalt fibers, which are made from volcanic rock and are therefore naturally resistant to chemical attack.
- III. Different types of percentages of glass powder are 0%, 10%,15%and 25% etc. are used as replacement aggregate. It is important to note that the optimal glass content in concrete can depend on several factors, such as the type of glass used, the specific application of the concrete, and the environmental conditions it will be exposed to.
- IV. The splitting tensile strength, flexural strength and flexural toughness of the concrete has been increased by the volume fraction of steel fibers in high strength light weight self-compacting concrete (HSLSCC) resulted in reduction of compressive strength.

- V. Both the basalt fiber and Poly vinyl alcohol fiber are used as additives to improve their mechanical properties of the concrete when comparing with both glass powder concrete and conventional concrete.
- VI. The optimum percentage of basalt fiber and Poly vinyl alcohol fiber are taken as 0.3 %. after that increasing the percentage of basalt fiber and Poly vinyl alcohol fiber their strength should be reduces.

CHAPTER 3

AIM AND SCOPE OF THE PRESENT INVESTIGATION

3.1 AIM OF THE STUDY

The aim of the study was described below,

To evaluate the potential of these materials in enhancing the mechanical, physical and durability properties of concrete. The project aims to investigate how the addition of basalt fibers and polyvinyl alcohol fibers with glass powder partial replacement with fine aggregate can affect the workability, compressive strength, tensile strength, flexural strength, and durability of concrete.

3.2 OBJECTIVE OF THE STUDY

1. To determine the properties of glass powder, aggregates and fibers.
2. To determine the mechanical properties (Compressive strength, flexural strength and splitting tensile) of concrete using glass powder as replacement of fine aggregate with basalt fiber and PVA fibers.

3.3 SCOPE OF THE STUDY

To examining the mechanical properties of the concrete, such as compressive strength, tensile strength, and flexural strength. In addition, the workability of the concrete, as well as its cost-effectiveness, would be analyzed. By comparing the performance of concrete with basalt fiber and poly vinyl alcohol fiber, this study would provide insights into which fiber type is better suited for use with glass powder as a replacement for fine aggregate in conventional concrete.

CHAPTER 4

METHODOLOGY

4.1 METHODOLOGY OF THE STUDY

The present experiment's methodology is illustrated in Figure 4.1, which exhibits a sequential process step by step.

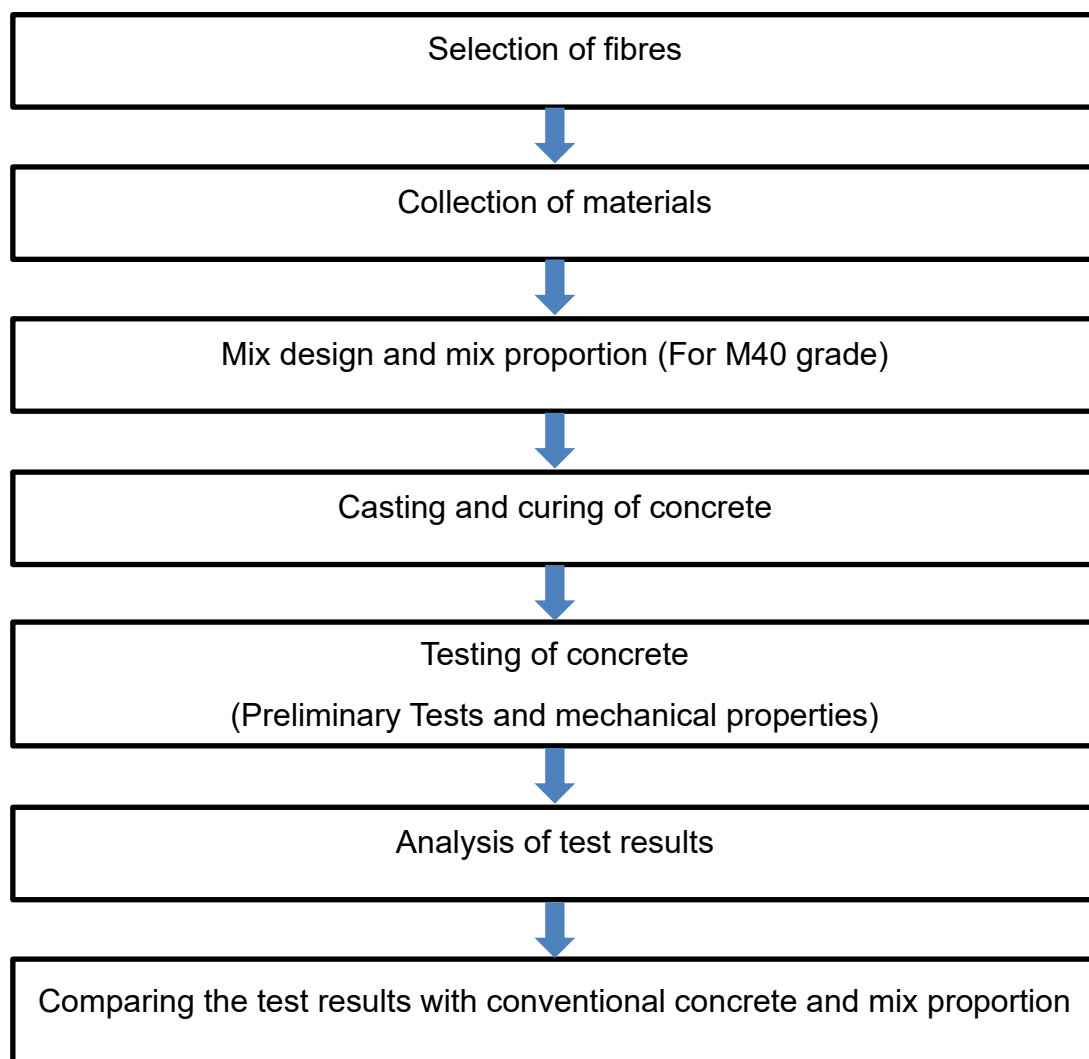


Figure 4.1 Flow Chart of Methodology

4.2 SELECTION OF FIBERS

We have chosen basalt fiber and polyvinyl alcohol fiber based on their desired properties, as outlined in Table (4.1). By incorporating these fibers, along with glass powder as a partial substitute for fine aggregate, it is anticipated that the mechanical properties and durability of concrete can be improved. Not only do these fibers offer a cost-effective and sustainable solution for the construction industry, but they also aid in achieving the desired qualities and enhancing the properties of conventional concrete.

4.3 MATERIALS

The following are the list of materials that are used in the experiment.

I. Cement:

Cement used for the experiment were Ordinary Portland cement (OPC) of 53 grade confirming to IS 8112.

II. Fine aggregate:

M-sand, the maximum size is 4.75mm Manufactured.

III. Coarse aggregate:

Crushed blue granite angular stone (20mm).

IV. Glass powder:

In this experiment we are using glass powder of size 90μ . The properties of the glass powder are mentioned in the table 4.1



Figure 4.2 Glass Powder

V. Basalt fiber:

Basalt fiber will be added to the concrete of 0.1%,0.2% and 0.3% and optimum level of basalt fiber was determined by 0.3%. In table 4.1, the properties of the Basalt fiber are mentioned.



Figure 4.3 Basalt Fiber

VI. Poly vinyl alcohol fiber:

Poly vinyl alcohol fiber will be added to the concrete of 0.1%,0.2% and 0.3% and optimum level of PVA fiber was determined by 0.3%. In table 4.1, the properties of the Poly vinyl alcohol fiber are mentioned.



Figure 4.4 Poly Vinyl Alcohol Fiber

4.4 PROPERTIES OF MATERIALS

The properties of replacement material and additives such as glass powder, basalt fiber and poly vinyl alcohol fiber are provided in the table 4.1

Table 4.1 Properties of Glass Powder, Basalt Fiber and PVA Fiber

Properties	Glass powder	Basalt fiber	Poly vinyl alcohol fiber
Chemical composition	made from silica, soda, lime, alumina, and boron	made from basaltic lava	made from synthetic polymer
Particle size	microns to a few millimeters	around 10 to 20 microns in diameter	around 20 to 30 microns in diameter
Mechanical properties	brittle, easily broken or shattered, can be compressed under high pressure	high tensile strength, high modulus of elasticity, low water absorption, lightweight	high tensile strength, high elongation at break, good adhesion to other materials
Thermal properties	low melting point, easily molded into different shapes	can withstand high temperatures up to 700°C	low melting point, easily molded into different shapes
Electrical properties	insulator	good electrical insulation properties	good electrical insulation properties
Environmental impact	can be recycled and reused	made from natural volcanic rock, recyclable and can be reused	biodegradable and can be broken down by microorganisms in the environment
Workability	can reduce workability of	can slightly reduce workability of	can improve workability of

	concrete due to its tendency to absorb water and reduce slump	concrete due to their tendency to clump together and form balls	concrete by reducing water demand and improving flowability
Compressive strength	can improve compressive strength of concrete due to its pozzolanic reaction	can improve compressive strength of concrete due to their high strength and modulus of elasticity	can slightly reduce compressive strength of concrete due to their low modulus of elasticity
Flexural strength	can improve flexural strength of concrete	can significantly improve flexural strength of concrete due to their high strength and modulus of elasticity	can improve flexural strength of concrete due to their high tensile strength and good adhesion to cement
Durability	can improve durability of concrete due to its ability to reduce permeability and improve resistance to chemical attack	can improve durability of concrete due to their high resistance to corrosion and fatigue	can improve durability of concrete due to their ability to reduce cracking and improve freeze-thaw resistance

4.5 CONCRETE MIX DESIGN

The following table (4.2) shows the ratio of materials that should be used to prepare the M40 grade concrete.

Table 4.2 Mix Design for M40 grade Concrete

MATERIALS	QUANTITY	RATIO
Cement (KG)	394 KG	1
Fine aggregate (KG)	632 KG	1.6
Coarse aggregate (KG)	1121 KG	2.84
Water (LIT)	157.6 LIT	0.4

4.6 MIX PROPORTION FOR FIBERS

The following tables (4.3 & 4.4) shows the mix proportion of concrete for basalt fiber and poly vinyl alcohol fiber.

FOR BASALT FIBER

The following table (4.3) shows the mix proportion of concrete for basalt fiber along with 15% Glass powder as a partial replacement of fine aggregate.

Table 4.3 Mix Proportion for Basalt Fiber

No of types	Mix proportion
Type 1	15% of Glass Powder + 0% Basalt Fiber
Type 2	15% of Glass Powder + 0.1% Basalt Fiber
Type 3	15% of Glass Powder + 0.2% Basalt Fiber
Type 4	15% of Glass Powder + 0.3% Basalt Fiber

FOR POLY VINYL ALCOHOL FIBER

The following table (4.4) shows the mix proportion of concrete for poly vinyl alcohol fiber along with 15% Glass powder as a partial replacement of fine aggregate.

Table 4.4 Mix Proportion for Poly Vinyl Alcohol Fiber

No of types	Mix proportion
Type 1	15% of Glass Powder + 0% PVA Fiber
Type 2	15% of Glass Powder + 0.1% PVA Fiber
Type 3	15% of Glass Powder + 0.2% PVA Fiber
Type 4	15% of Glass Powder + 0.3% PVA Fiber

4.7 CASTING OF CONCRETE

The following are the steps for the casting process of concrete.

Based on the mix design and mix proportion all the materials should be prepared with careful attention paid to the accuracy of the measurement and the quality of the materials is used.

After the preparation of all materials, the concrete should be mixed thoroughly, by using the hand until a homogenous mixture is obtained. The mix should be monitored to ensure that it is consistent and uniform.

The concrete should be cast into the desired moulds, such as cube (Dimension = 150 mm*150mm*150mm) for compression test, cylinders (Height = 300mm and Diameter = 150mm) for splitting tensile strength test and short columns (Dimensions = 500mm*100mm*10mm) for the flexural strength test.



Figure 4.5 Mixing



Figure 4.6 casting of concrete specimens

4.8 CURING OF CONCRETE

The following are the steps for the curing process of concrete.

After the casting work is completed, the concrete specimens are removed from their moulds and left to dry in the sunlight for a period of time. And the concrete specimens should be cured for 7 days and 28 days based on requirements in a controlled environment that maintains the desired temperature and humidity conditions.

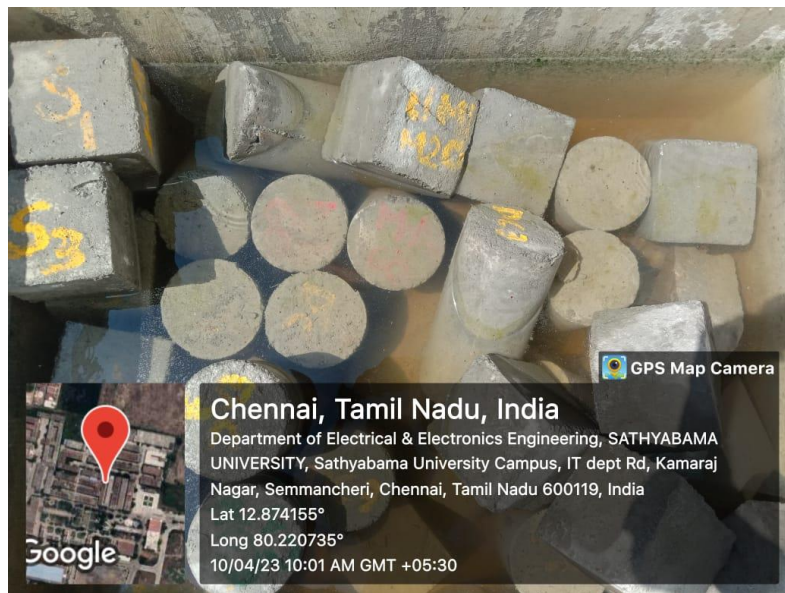


Figure 4.7 curing of concrete specimens

4.9 EXPERIMENTAL INVESTIGATION

For every concrete-based experiment it is mandatory to do preliminary test and mechanical properties tests

PRELIMINARY TESTS

The following are the list of tests conducted on aggregate which will help to specify the physical properties of aggregate such as fineness modulus and specific gravity.

4.9.1 FINENESS OF FINE AGGREGATE

The experiment Fineness Modulus (FM) is a measure of the fineness of a fine aggregate (such as sand). It is an empirical figure that is obtained by adding the total percentage of the sample of sand that is retained on each of a specified series of sieves and dividing the sum by 100.

The specified series of sieves used for determining the Fineness Modulus are generally the 4.75mm, 2.36mm, 1.18mm, 600-micron, 300-micron, 150-micron and 75-micron sieves. The amount of sand retained on each of these sieves is recorded as a percentage of the total weight of the sand sample.

The formula used to calculate the fineness modulus is

$$\text{Fineness modulus of fine aggregate} = \frac{\text{Sum of cumulative percentage weight retained of aggregate}}{100}$$

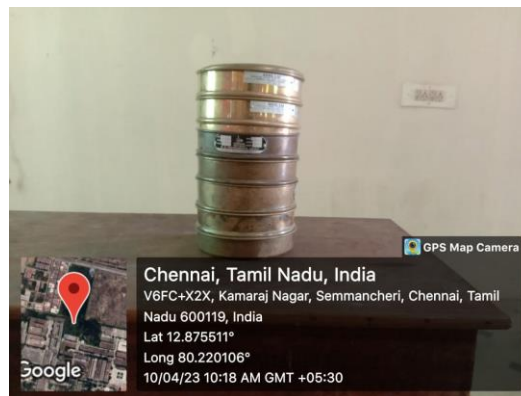


Figure 4.8 Fineness Modulus of Fine Aggregate

4.9.2 FINENESS OF COARSE AGGREGATE

The experiment Fineness Modulus of coarse aggregates represents the average size of the particles in the aggregate by an index number. It is calculated by performing a sieve analysis using a set of standard sieves. The cumulative percentage of the coarse aggregate retained on each sieve is added together, and then the sum is divided by 100 to obtain the Fineness Modulus value.

The standard sieves used in the sieve analysis for coarse aggregates are different from those used for fine aggregates. They typically include the 80mm, 40mm, 20mm, 10mm, 4.75mm, 2.36mm, 1.18mm, 600-micron, 300-micron, and 150-micron sieves. The coarse aggregate sample is passed through each of these sieves, and the amount of material retained on each sieve is measured as a percentage of the original sample weight.

The formula used to calculate the fineness modulus of coarse aggregate is

$$\text{Fineness modulus of coarse aggregate} = \frac{\text{Sum of cumulative percentage weight retained of aggregate}}{100}$$

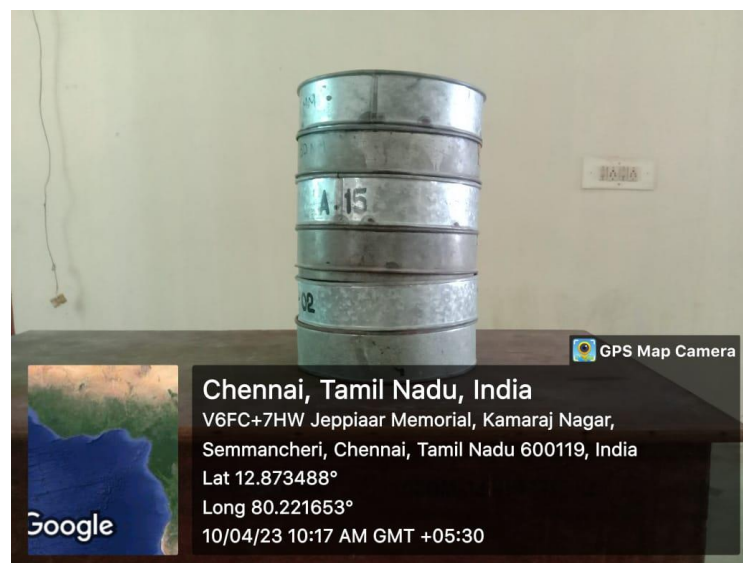


Figure 4.9 Fineness Modulus of Coarse Aggregate

4.9.3 SPECIFIC GRAVITY TEST

The experiment specific gravity of fine aggregate (sand) is the ratio of the weight of given volume of aggregates to the weight of equal volume of water. For calculating the specific gravity of given material, we are using pycnometer equipment or density bottle.

The formula used to calculate the specific gravity is

$$\text{Specific gravity (G)} = (W_2 - W_1) / ((W_2 - W_1) - (W_3 - W_4))$$

Where:

W_1 = Weight of empty bottle

W_2 = Weight of bottle + sand

W_3 = Weight of bottle+ sand + water

W_4 = Weight of bottle+ water

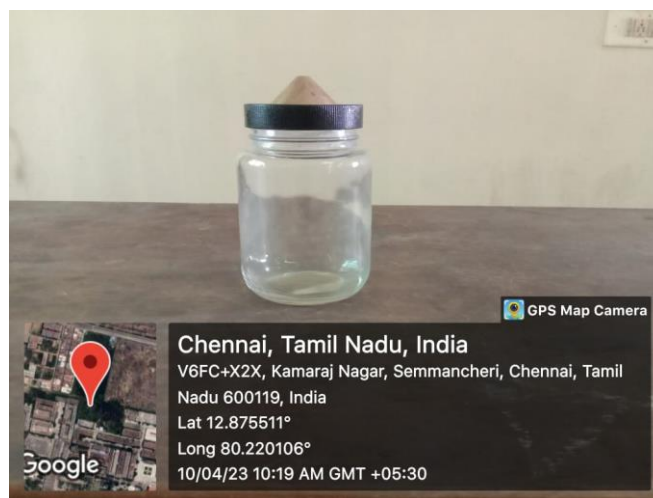


Figure 4.10 Pycnometer

TESTS ON CONCRETE

The following are the tests conducted on concrete specimens which are used to determine the mechanical properties such as compression strength, flexural strength and splitting tensile strength

4.9.4 COMPRESSIVE STRENGTH TEST

Compressive strength of concrete that indicates its ability to resist external loads without breaking or deforming. It is a crucial factor in determining the durability and strength of concrete structures.

The compressive strength of concrete is typically measured by applying a compressive load to a cubical specimen of concrete in a controlled manner. The load is gradually increased until the specimen fails or breaks, and the maximum load that the specimen can bear is noted as its compressive strength.

The compressive strength of concrete depends on a variety of factors, such as the mix design, curing conditions, quality of materials used, and the age of the concrete.

The formula used to calculate the compressive strength of concrete specimen is

$$f_c = P/A$$

Where:

f_c = the compressive strength of concrete in psi (pounds per square inch) or MPa (megapascals)

P = the maximum compressive load applied to the specimen

A = the cross-sectional area of the specimen in square inches or square millimeters.

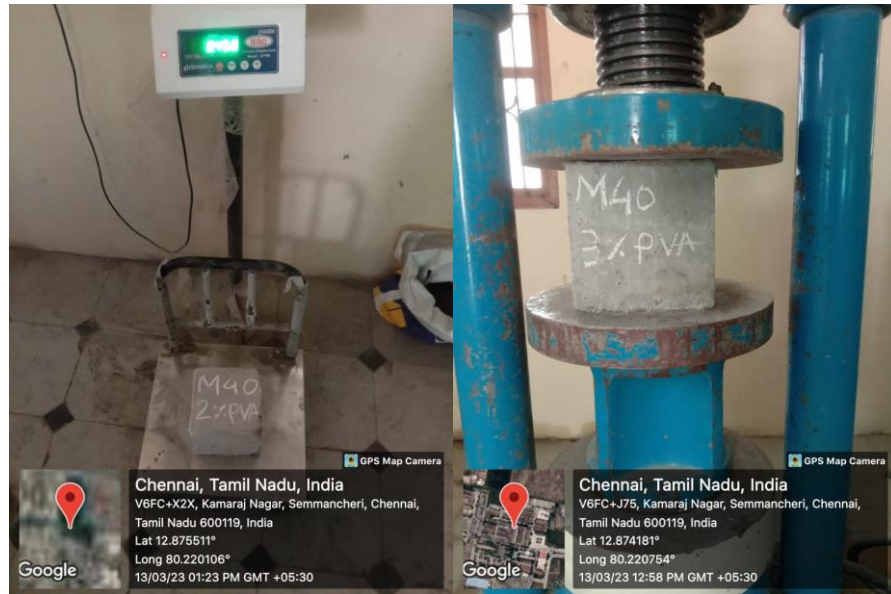


Figure 4.11 compressive strength machine



Figure 4.12 Dial gauge readings

4.9.5 SPLITTING TENSILE STRENGTH TEST

The splitting tensile strength of concrete is an important property that affects the behavior of concrete structures. It is a measure of the tensile strength of concrete, which is the ability of concrete to resist forces that tend to pull it apart.

The split tensile strength is typically determined by applying a compressive force to a cylindrical concrete specimen along its axis and measuring the tensile force required to split the specimen into two halves along a diametrical plane.

The splitting tensile strength is then calculated by dividing the maximum applied load by the appropriate geometrical factors.

The formula used to calculate the splitting tensile strength of concrete specimen is

$$f_t = 2P / (\pi * D * L)$$

where:

f_t = the splitting tensile strength of concrete in psi (pounds per square inch) or MPa (megapascals)

P = the maximum load applied to the specimen at failure

D = the diameter of the cylindrical specimen in inches or millimeters

L = the length of the cylindrical specimen in inches or millimeters.



Figure 4.13 splitting tensile strength machine



Figure 4.14 Dial gauge readings

4.9.6 FLEXURAL STRENGTH TEST

Flexural strength is one measure of the tensile strength of concrete. It is a measure of the ability of an unreinforced concrete beam or slab to resist failure in bending, which is a common mode of failure in many concrete structures.

Flexural strength is typically determined by testing a beam or slab or short column specimen in a four-point bending test. In this test, a load is applied to the specimen at two points along its length, and the specimen is supported at two points near the load points. The load is gradually increased until the specimen fails, and the maximum load at failure is recorded.

The formula used to calculate the flexural strength of concrete specimen is

$$f_{cr} = PL/bd^2$$

Where:

f_{cr} = the flexural strength of concrete in psi (pounds per square inch) or MPa (megapascals)

P = Maximum load applied at the midpoint of the specimen

L = Support span

b = Width of the specimen

d = Depth of the specimen

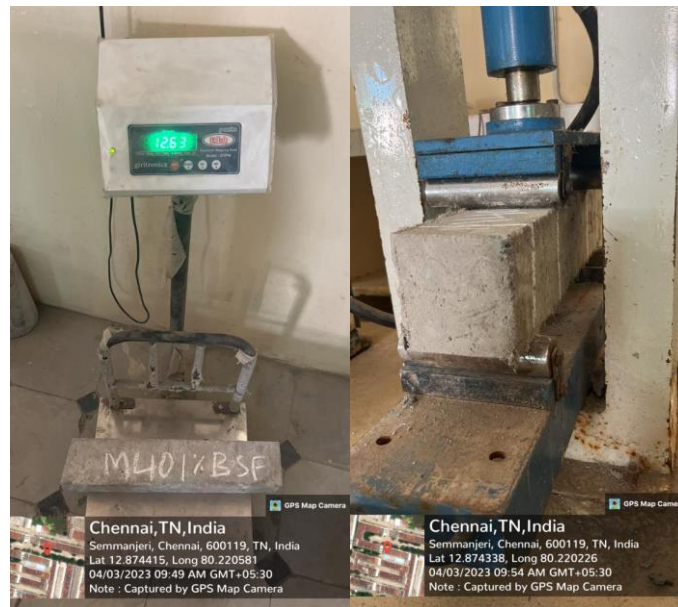


Figure 4.15 Flexural strength machine



Figure 4.16 Dial gauge readings

CHAPTER 5

RESULTS AND DISCUSSION

5.1 PRELIMINARY TEST ON MATERIALS

The tests conducted on aggregate listed below aid in determining the physical properties of aggregate, such as fineness modulus and specific gravity.

5.1.1 FINENESS OF FINE AGGREGATE

The fineness modulus of fine aggregate is calculated and the readings are noted down in the table 5.1.

Table 5.1 Fineness Modules of Fine Aggregate

s.no	Sieve size	Weight retained in gm	Percentage of weight retained	Cumulative percentage of weight retrained	Cumulative percentage of weight passing
1	4.75 mm	0	0	0	0
2	2.36 mm	0	0	0	0
3	1.18 mm	600	50	50	50
4	600 microns	150	15	65	35
5	300 microns	210	21	86	14
6	150 microns	100	10	96	4
7	75 microns	40	4	100	0
8	Pan	0	0	100	0

CALCULATION

Fineness modules of fine aggregate = Sum of cumulative percentage weight retained
of aggregate / 100

Fineness modules of fine aggregate = (0+0+50+65+86+96+100+100) / 100

$$= 4.97$$

As per IS-383: 1970 if the value of fineness modulus of fine aggregate is more than 3.5 then it is said to be coarse sand. Therefore, from the achieved result 4.97 the investigation conclude that it is coarse sand

5.1.2 FINENESS OF COARSE AGGREGATE

The fineness modulus of coarse aggregate is calculated and the readings are noted down in the table 5.2.

Table 5.2 Fineness Modules of Fine Aggregate

s.no	Sieve size	Weight retained in gm	Percentage of weight retained	Cumulative percentage of weight retrained	Cumulative percentage of weight passing
1	80 mm	0	0	0	0
2	40 mm	0	0	0	0
3	20 mm	2050	41	41	59
4	10 mm	2910	58.2	99.2	0.8
5	4.75 mm	0	0.8	100	0
6	2.36 mm	0	0	100	0
7	1.18 mm	0	0	100	0
8	600 microns	0	0	100	0
9	300 microns	0	0	100	0
10	150 microns	0	0	100	0
11	Pan	0	0	100	0

CALCULATION

Fineness modules of coarse aggregate = Sum of cumulative percentage weight

retained of aggregate / 100

$$\begin{aligned}\text{Fineness modulus of fine aggregate} &= \\ (0+0+41+99.2+100+100+100+100+100+100) / 100 \\ &= 7.4\end{aligned}$$

As per IS-383: 1970 if the value of fineness modulus of coarse aggregate is ranges from 5.5 to 8. Based on achieved result 7.4 the investigation conclude that it is in the range.

5.1.3 SPECIFIC GRAVITY TEST

The bellow calculation represents the specific gravity of fine aggregate.

CALCULATION

The specific gravity of aggregate is calculated as

W_1 = Weight of empty bottle = 610 gm

W_2 = Weight of bottle + sand = 1170 gm

W_3 = Weight of bottle+ sand + water = 1770 gm

W_4 = Weight of bottle+ water = 1410 gm

$$\begin{aligned}\text{Specific gravity} &= (W_2 - W_1) / (W_2 - W_1) - (W_3 - W_4) \\ &= (1170 - 610) / (1170 - 610) - (1770 - 1410) \\ &= 3.11\end{aligned}$$

As per ACI method the specific gravity of fine aggregate is 2.65 for M40 grade concrete but here the result is 3.11 based on this the investigation concludes the concrete has higher density than before.

5.2 TESTS ON CONCRETE

The tests conducted on concrete listed below aid in determining the mechanical properties of concrete, such as compression test, flexural test and splitting tensile test.

5.2.1 COMPRESSION STRENGTH TEST

The average compressive strength value for every concrete mix proportion is tabulated in table. The below tabulation consists the compressive strength value for both 7 days and 28 days.

Table 5.3 Analysis of Compression Strength on all Concrete Mix Proportion

S.NO	MIX PROPORTION	COMPRESSION STRENGTH TEST VALUE IN MPa	
		7 DAYS	28 DAYS
1	Conventional concrete	27.11	41.01
2	15% Glass powder concrete	27.53	41.65
3	15% Glass powder + 0.1% Basalt fiber	27.85	41.80
4	15% Glass powder + 0.2% Basalt fiber	28.15	42.24
5	15% Glass powder + 0.3% Basalt fiber	30.96	43.00
6	15% Glass powder + 0.1% PVA fiber	27.00	40.80
7	15% Glass powder + 0.2% PVA fiber	27.50	41.50
8	15% Glass powder + 0.3% PVA fiber	29.93	42.60

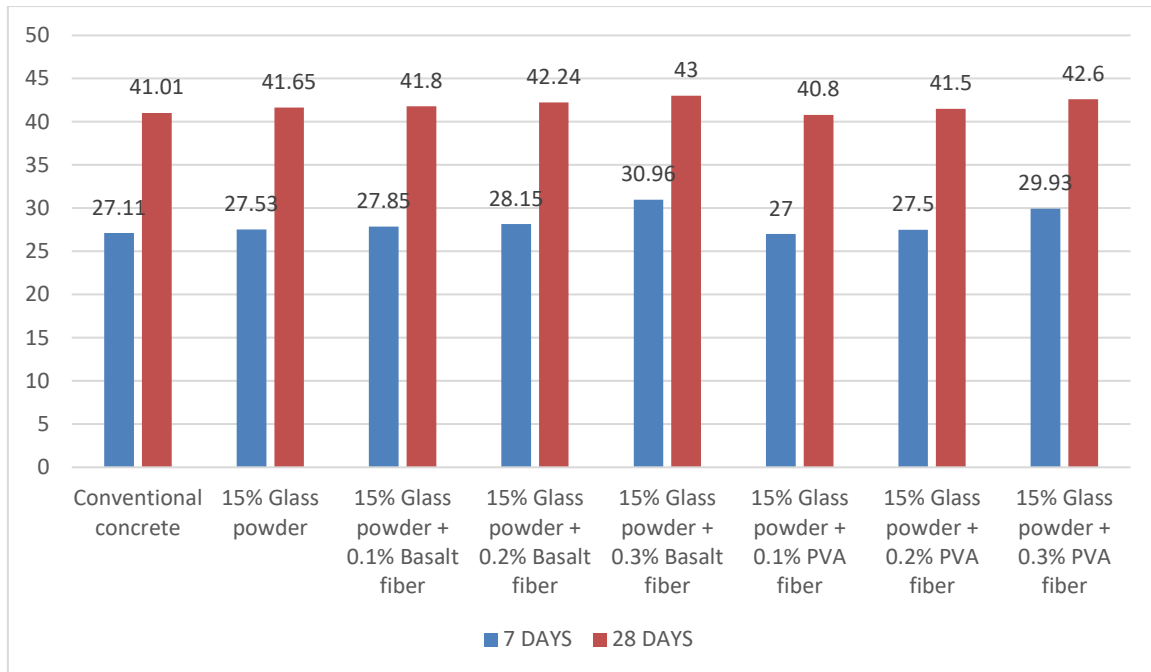


Figure 5.1 Comparing 7 days and 28 days Compression Strength Test value

Based on the above table and figure clearly observe that for both 7 days and 28 days the concrete mix proportion with 15% Glass powder + 0.3% Basalt fiber have high compressive strength value than both 15% Glass powder + for all proportions of poly vinyl alcohol fiber, 15% Glass powder concrete and conventional concrete.

5.2.2 SPLITTING TENSILE STRENGTH TEST RESULTS

The average splitting tensile strength value for every concrete mix proportion is tabulated in table. The below tabulation consists the splitting tensile strength value for both 7 days and 28 days.

Table 5.4 Analysis of Splitting Tensile Strength Test on all Concrete Mix Proportion

S.NO	MIX PROPORTION	SPLITTING TENSILE STRENGTH TEST VALUE IN MPa	
		7 DAYS	28 DAYS
1	Conventional concrete	2.44	3.69
2	15% Glass powder concrete	2.46	3.73
3	15% Glass powder + 0.1% Basalt fiber	2.50	3.76
4	15% Glass powder + 0.2% Basalt fiber	2.60	3.80
5	15% Glass powder + 0.3% Basalt fiber	2.78	3.87
6	15% Glass powder + 0.1% PVA fiber	2.58	3.82
7	15% Glass powder + 0.2% PVA fiber	2.68	3.88
8	15% Glass powder + 0.3% PVA fiber	2.80	3.90

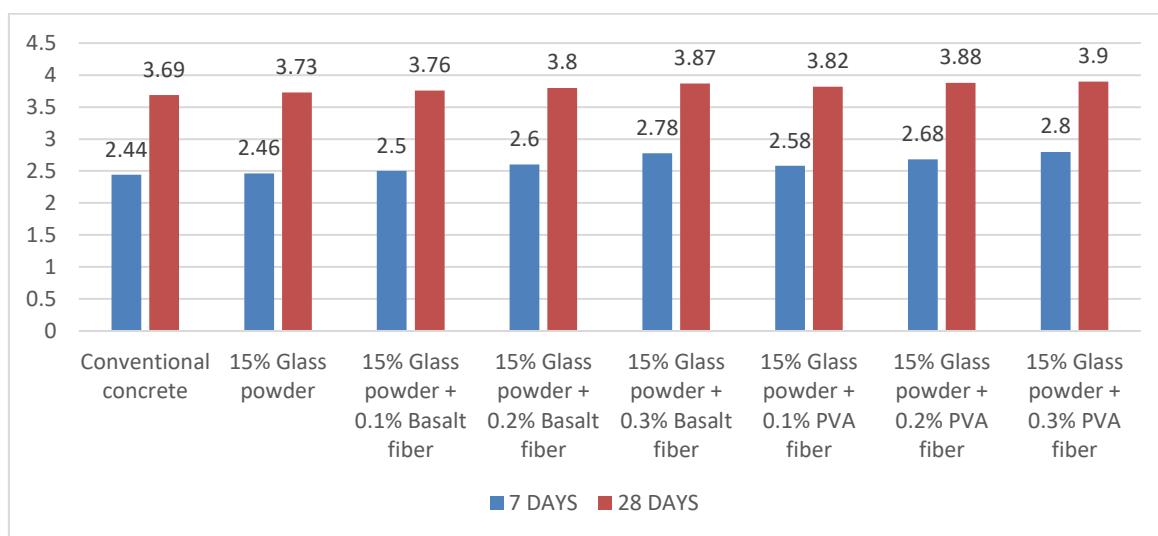


Figure 5.2 Comparing 7 days and 28 days Splitting Tensile Strength Test value

Based on the above table and figure clearly observe that for both 7 days and 28 days the concrete mix proportion with 15% Glass powder + 0.3% poly vinyl alcohol fiber have high splitting tensile strength value than both 15% Glass powder + for all proportions of Basalt fiber, 15% Glass powder concrete and conventional concrete.

5.2.3 FLEXURAL STRENGTH TEST RESULTS

The average flexural strength value for every concrete mix proportion is tabulated in table. The below tabulation consists the flexural strength value for both 7 days and 28 days.

Table 5.5 Analysis of Flexural Strength Test on all Concrete Mix Proportion

S.NO	MIX PROPORTION	SPLITTING TENSILE STRENGTH TEST VALUE IN MPa
		28 DAYS
1	Conventional concrete	3.50
2	15% Glass powder concrete	3.60
3	15% Glass powder + 0.1% Basalt fiber	3.58
4	15% Glass powder + 0.2% Basalt fiber	3.62
5	15% Glass powder + 0.3% Basalt fiber	3.72
6	15% Glass powder + 0.1% PVA fiber	3.60
7	15% Glass powder + 0.2% PVA fiber	3.71
8	15% Glass powder + 0.3% PVA fiber	3.76

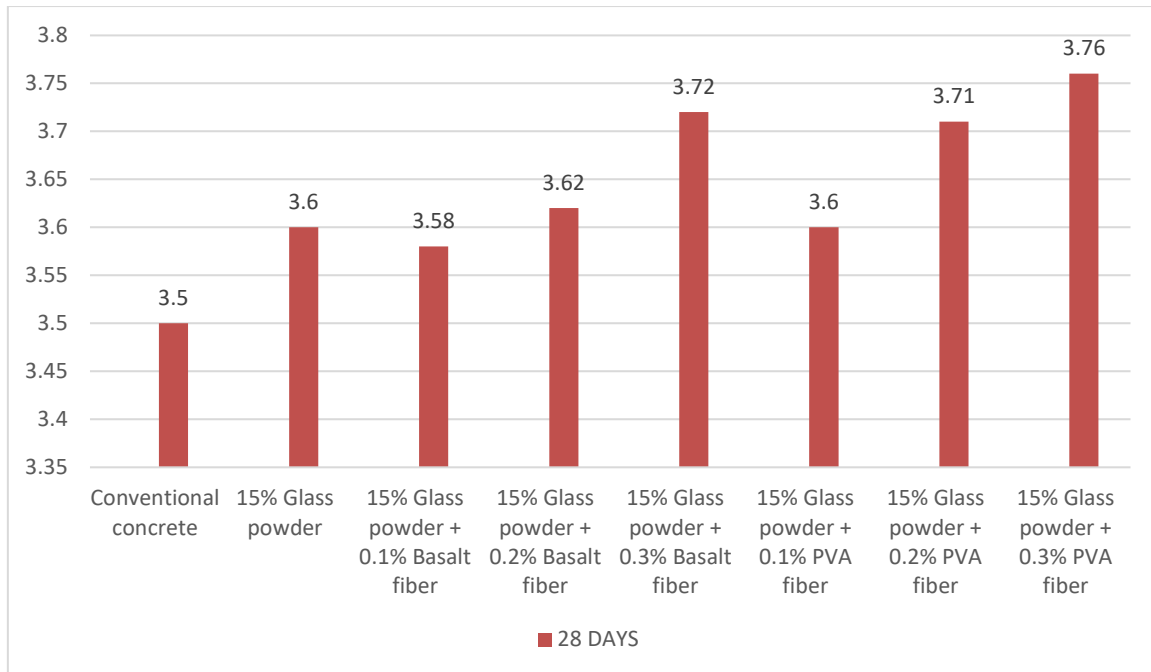


Figure 5.3 Comparing 28 days Flexural Strength Test value

Based on the above table and figure clearly observe that for both 7 days and 28 days the concrete mix proportion with 15% Glass powder + 0.3% Poly vinyl alcohol fiber have high flexural strength value than both 15% Glass powder + for all proportions of Basalt fiber, 15% Glass powder concrete and conventional concrete.

5.3 COST ESTIMATION

The cost estimation is calculated for 1 m³ concrete based on their individual quantities along with their rates.

5.3.1 COST OF CONVENTIONAL CONCRETE

The individual quantities and rates are used to calculate the cost estimation for 1 m³ of conventional concrete. The below table (5.6) shows the estimation for the 1 m³ conventional concrete.

Table 5.6 Cost Estimation for Conventional Concrete

MATERIALS	TOTAL QUANTITY	RATE PER KG	TOTAL COST
Cement	394 KG	8 Rs	3152 Rs
Fine aggregate	744 KG	2.4 Rs	1785.6 Rs
Coarse aggregate	1121 KG	2 Rs	2242 Rs

CALCULATION

$$\begin{aligned}\text{Total cost for } 1\text{m}^3 \text{ conventional concrete} &= 3152 + 1785.6 + 2242 \\ &= \text{Rs } 7179.6\end{aligned}$$

5.3.2 COST OF CONCRETE WITH GLASS POWDER

The individual quantities and rates are used to calculate the cost estimation for 1 m³ of concrete with Glass powder. The below table (5.7) shows the estimation for the 1m³ concrete with Glass powder.

Table 5.7 Cost Estimation Concrete with Glass Powder

MATERIALS	TOTAL QUANTITY	RATE PER KG	TOTAL COST
Cement	394 KG	8 Rs	3152 Rs
Fine aggregate	632 KG	2.4 Rs	1516.8 Rs
Coarse aggregate	1121 KG	2 Rs	2242 Rs
Glass powder	112 KG	45 Rs	5040 Rs

CALCULATION

$$\begin{aligned}\text{Total cost for } 1\text{m}^3 \text{ concrete with Glass powder} & \\ &= 3152 + 1516.8 + 2242 + 5040 \\ &= \text{Rs } 11950.8\end{aligned}$$

5.3.3 COST OF CONCRETE WITH GLASS POWDER AND BASALT FIBER

The individual quantities and rates are used to calculate the cost estimation for 1 m³ of concrete with Glass powder and Basalt fiber. The below table (5.8) shows the estimation for the 1m³ concrete with Glass powder and Basalt fiber.

Table 5.8 Cost Estimation Concrete with Glass Powder and Basalt Fiber

MATERIALS	TOTAL QUANTITY	RATE PER KG	TOTAL COST
Cement	394 KG	8 Rs	3152 Rs
Fine aggregate	632 KG	2.4 Rs	1516.8 Rs
Coarse aggregate	1121 KG	2 Rs	2242 Rs
Glass powder	112 KG	45 Rs	5040 Rs
Basalt fiber	0.7039 KG	1385 Rs	974.90 Rs

CALCULATION

Total cost for 1m³ concrete with Glass powder and Basalt fiber

$$= 3152+1516.8+2242+5040+974.90$$

$$= \text{Rs } 12925.7$$

5.3.4 COST OF CONCRETE WITH GLASS POWDER AND PVA FIBER

The individual quantities and rates are used to calculate the cost estimation for 1 m³ of concrete with Glass powder and PVA fiber. The below table (5.9) shows the estimation for the 1m³ concrete with Glass powder and PVA fiber.

Table 5.9 Cost Estimation Concrete with Glass Powder and PVA Fiber

MATERIALS	TOTAL QUANTITY	RATE PER KG	TOTAL COST
Cement	394 KG	8 Rs	3152 Rs
Fine aggregate	632 KG	2.4 Rs	1516.8 Rs
Coarse aggregate	1121 KG	2 Rs	2242 Rs
Glass powder	112 KG	45 Rs	5040 Rs
PVA fiber	0.7039 KG	1035 Rs	728.5 Rs

CALCULATION

Total cost for 1m³ concrete with Glass powder and PVA fiber

$$= 3152+1516.8+2242+5040+728.5$$

$$= \text{Rs } 12679.3$$

Based on the above cost estimation results the cost of concrete with Glass powder and Basalt fiber is Rs 246.4 more than concrete with Glass powder and PVA fiber. Concrete with Glass powder and PVA fiber is Rs 728.5 more than concrete with Glass powder. Concrete with glass powder is Rs 4771.2 more than conventional concrete.

CHAPTER 6

CONCLUSION

6.1 CONCLUSION

- I. Basalt Fiber concrete of 0.3% having higher the compressive strength (30.96 MPa for 7 days and 43 MPa for 28 days) as compared with 0.3% poly vinyl alcohol fiber concrete (29.93 MPa for 7 days and 42.60 MPa for 28 days) and the conventional concrete (27.11 MPa for 7 days and 41.01 MPa for 28 days).
- II. Therefore, from the experimental study, it was observed that the percentage of basalt fiber in concrete increases, the workability of the concrete decreases. We based this conclusion on the slump test performed on the day of concrete mixing.
- III. When compare with conventional concrete, the strength was increasing with reinforced basalt fiber.
- IV. Compared to basalt fiber and conventional concrete, polyvinyl alcohol fiber exhibits higher splitting tensile strength and flexural strength.
- V. Furthermore, it was also determined that the flexural strength of the concrete with 0.1% basalt fiber and 15% glass powder is slightly lower than that of the concrete with 15% glass powder alone.

6.2 FUTURE SCOPE

- I. The cost estimation calculation revealed that the highest cost was associated with basalt fiber in comparison to Poly vinyl alcohol fiber, glass powder concrete, and conventional concrete. To reduce the cost estimation, both basalt fiber and Poly vinyl alcohol fiber should be added based on their proportions.
- II. By using combination of both Basalt fiber and poly vinyl alcohol fiber the concrete can improve the mechanical properties and reduce the cost.

III. By reducing the percentage of glass powder as a partial replacement of fine aggregate to reduce the cost and also observe if there is any improvement in their mechanical properties of concrete.

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Compare The Behaviour of Concrete with Basalt Fiber and Poly Vinyl Alcohol Fiber Using Glass Powder as Replacement of Fine Aggregate With Conventional Concrete.

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ABSTRACT:

In the construction industry world, use of alternative source as construction material is a recent trend which can reduce the effect on environmental conditions, reduce the different types pollution effects, used for energy consumption also. In this project we are using partial replacement glass powder with fine aggregate and basalt fibre and poly vinyl alcohol fibre using as admixture. Basalt fiber has recently gained popularity in concrete applications due to its environmentally friendly manufacturing process and excellent mechanical properties. Basalt fibers are relatively cheaper and new fibers for concrete recently investigated by a few researchers. In this study, the effect of inclusion of basalt fibers on the compressive strength, flexural and splitting tensile strength of fiber concrete was studied. The influence of addition of 0.1, 0.2 and 0.3% Basalt Fiber volume fraction in three different mix proportions of total volume of concrete is investigated and compared it with conventional concrete. Polyvinyl alcohol (PVA) fibre is considered as one of the most suitable polymeric fibers to be used in concrete, though the unique microstructure characteristics of PVA fiber add challenge to the material design. There are different types of fiber are available in the market but using this PVA fiber in this project, for the purpose, it was nontoxic and has more tensile strength when compared to many other fibers. In this study, the effect of inclusion of poly vinyl alcohol fibers on the compressive strength, splitting tensile strength and flexural strength pf fiber concrete was studied. the influence of addition of 0.1,0.2 and 0.3% poly vinyl fiber volume fraction in three different mix proportions of total volume of concrete is investigated and compared it with conventional concrete. In this study, the effect of inclusion of poly vinyl alcohol fibers on the compressive strength, splitting tensile strength and flexural strength pf fiber concrete was studied. the influence of addition of 0.1,0.2 and 0.3% poly vinyl fiber volume fraction in three different mix proportions of total volume of concrete is investigated and compared it with conventional concrete. Experimental results showed that the addition of basalt fiber and poly vinyl alcohol fiber up to 0.3% Basalt fiber and poly vinyl alcohol fiber volume individually with concrete improved the compressive strength and flexural strength. In the corresponding to maximum compressive and Flexural strength results was observed at all fiber volumes, whereas there is a negligible influence of the fiber addition on the splitting tensile strength. The overall test results shows that basalt Fiber and poly vinyl alcohol fiber could be utilized in concrete which improves the mechanical properties of concrete. From the experimental getting results we conclude that for compression values basalt fiber got the little bit higher value than poly vinyl alcohol fiber but for splitting tensile strength and flexural strength poly vinyl alcohol got the higher values than the basalt fibre mix proportion.

Keywords: *Basalt fibre, poly vinyl alcohol fibre, Glass powder, Compressive strength*