HOD MESSAGE

Dr. V. K. Naik

I am very happy to publish forth issue of departmental Technical magazine for AY-24-25. This issue is a reflection of the research area of the student and expertise they have achieved. The credit of combining most of article in the form of such goes to the editorial team of students.

On behalf of my department, I am also thankful to Executive Director Hon. Shri Anil Bagane, Principal Dr. S.A Khot, who are keeping us motivated all the time.

Last but not least I am also very thankful to my departmental faculty member ,supporting staff for doing everything to contribute the success of the department.

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Vision, Mission and Quality Policy and PEO of Department

Vision of the Department

To be a center of excellence in various sub-branches of Civil Engineering to prepare professionally competent engineers with a lifelong learning attitude for the accomplishment of ever-growing needs of society.

Mission of the Department

To prepare technically and professionally competent engineers by imparting quality education through effective teaching-learning methodologies and providing a stimulating environment for research and innovation

To develop professional skills and the right attitude in students that will help them to succeed and progress in their personal and professional career

To imbibe moral and ethical values in students with concern to society and the environment

The Program Educational Objectives (PEOs)

PEO I: Demonstrate capabilities to develop an optimal solution to the real-world engineering problems by applying the theory-based practical approach of civil engineering and related interdisciplinary fields.

PEO II: Exhibit professional skills, ethical attitude and sensitivity towards society and environment.

PEO III: Engage in life-long learning for successful adaptation to technological changes.

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Advance Slab Finishing Machine

Sannidhi Patil [1], Prajakta Koli[2] , Simran Kamble [3], Shweta Koli[4]
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Abstract

The automatic slab finishing machine is designed to enhance the efficiency and quality of surface finishing in industrial settings, particularly in the manufacturing of slabs used in construction and other applications. This project integrates advanced automation technologies with precision engineering to create a machine capable of performing consistent and high-quality finishing operations. By automating the finishing process, this machine significantly reduces manual labor, enhances safety, and increases production throughput. It also ensures a consistent finish, minimizing defects and material wastage.The project demonstrates the potential of automation in industrial applications, showcasing improvements in efficiency, cost-effectiveness, and product quality. The automatic slab finishing machine represents a significant advancement in manufacturing technology, offering a robust solution for modern industrial needs.

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1. INTRODUCTION

The smoothing of a concrete floor is a laborious task which is to be executed in a hunched position, synchronized with the setting of concrete. In addition, at which timing to start the work entirely depends on the "intuition" of a skilled plasterer. In summer the work must be done in a short time while in winter it needs to be done slowly for many hours, from midnight to the next morning. Therefore the work mostly depends on the hands of skilled and experienced plasterers. However, the number of plasterers has decreased sharply. To overcome the shortage of labor, the industry has long desired to develop and introduce a labor-saving, automatized machine. And till now several types of concrete floor finishing robots have been developed

2. METHODOLOGY

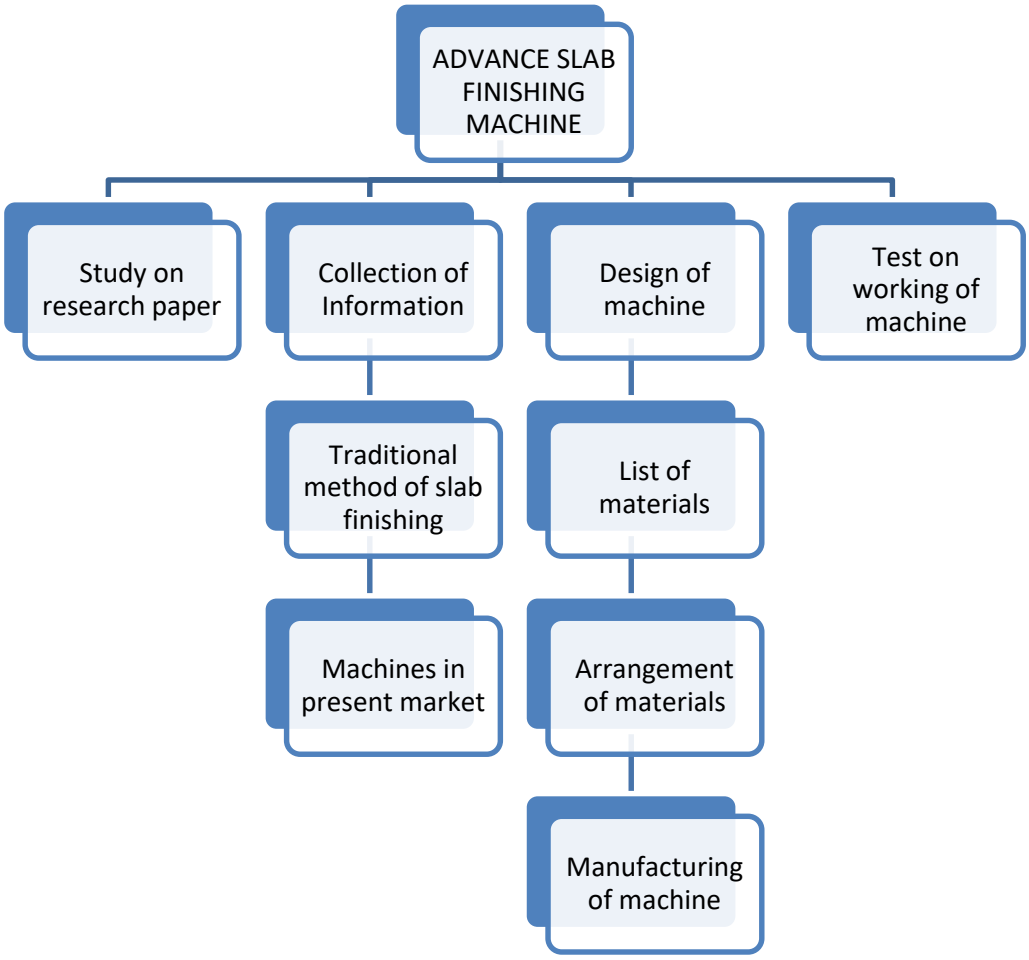

Fig. 1 Methodology

DESIGN OF MACHINE

List of Material

- Trolley brush cutter
- Stand arbour
- Gear box
- Pulley
- V Belt
- Nut bolts
- MS sheet
- MS plate
- Steel bar

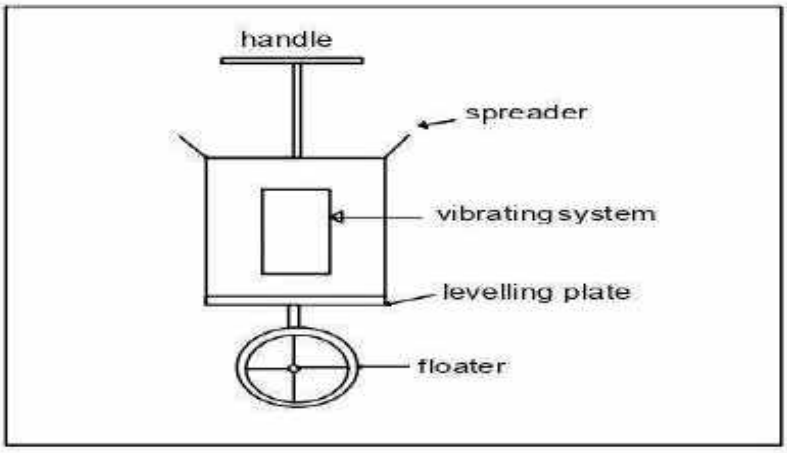

Fig. 2 Design of machine

MATERIAL SPECIFICATION

Sr.No.	Material	Specification	Weight	Price
1.	Trolley brush cutter	Gasoline engine with double grip handle.2 stroke engine	12.5 kg	9,500/-
2.	Stand arbour	12.5" , cast iron material	5 kg	1,600/-
3	Lawn mover gear box	Material - Aluminium	2.5 kg	1,500/-
4.	Gear box	Material -iron	4 kg	1,600/-
5.	Pulley	Material - Iron	400 gm	150/-
6.	V Belt	Size - A41	400 gm	250/-
7.	Nut bolts	3" – 6 ;1.5" – 4 ;1" - 6	500 gm	50/-
8.	MS Sheet	18 gauze – 20" * 24"; 32" * 5"; 24" * 2.5"	4 kg	320/-
9.	MS flate	25 * 5 mm 80"	2.29 kg	150/-
10.	Steel Bar	12 mm Square bar	500 gm	35/-

Assembly of Machine

Fig. 3 trolley brushcutter

Fig. 4 shaft

Fig. 5 lawn moter gear box

Fig.6 gear box

Fig. 7 pulley

Fig .8 Fixing of Floater

Fig. 9 Aligning of Vibrator

Fig. 9 Fixing of vibrator

Fig. 10 Machine Photograph

OBJECTIVES

- To study the machines used for slab concreting.
- To reduce number of machines used during the concreting work.
- To design and develop a machine which conduct all in one activity i.e., spreading, vibrating and finishing.

CONCLUSIONS

The development of the Advance Slab Finishing Machine aimed to enhance the efficiency and consistency of slab finishing processes in industrial applications. The machine advances the surface finishing tasks traditionally done manually, reducing labor costs and improving product quality. The machine successfully advances the slab finishing process, significantly reducing the time required compared to manual methods. By standardizing the finishing process, the machine ensures uniform quality across all finished slabs, minimizing defects and variations. Advancement decreases the dependency on manual labor, leading to cost savings and allowing workers to focus on more complex tasks. The machine mitigates risks associated with manual slab finishing, such as repetitive strain injuries and exposure to hazardous materials.

ACKNOWLEDGEMENT

We would like to express our gratefulness and sincere gratitude to my guide Mr. A. B. Jadhav, for guiding us to accomplish this project work. It was our privilege and pleasure to work under his able guidance, we are indeed grateful to him for providing helpful suggestion, from time to time. Due to his constant encouragement and inspiration we are able to present this project. We are thankful to our parents for their moral as well as financial support.

SCIENTIFIC APPROACH OF VASTU SHASTRA

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1,2,3,4 Students, Department of Civil Engineering, SITCOE, Yadrav, Kolhapur

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Abstract - Vastu Shastra is an ancient Indian system of architecture and design that imphasizes the balance and harmony of the natural and built environment. Vastu Shastra is an ancient system of Architecture, conceived in India that deals with the principles designed to make the specific use of climate as one of its dominant factors in designing of a building. Vastu Shastra is based on the knowledge of the sun movement, Earth's Magnetic field, and the Empathic Zones considering which many rules have been elaborated in Ancient books of India. In the current scenario, some architects consider it superstitious while others recommend it as flexible guidelines for planning of spaces considering environmental aspects. The knowledge of Vastu Shastra is collectively understood as the concept of instrumental understanding, sense understanding, theoretical and scientific understanding elaborating its own philosophical studyOver the centuries.

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1. INTRODUCTION

Vastu-shastra is a vast and ancient science of living. The word Vastu is derived from the root 'Vas' which means 'to reside'.Vastu means dwelling of Humans and Gods in the original Sanskrit literature. Many factors govern the life of a human being his fate, Karma and surroundings. The origin of Vaastu shastra may have taken place well over thousands of years ago. The learned men of those days may not have lived in houses themselves but they most definitely dedicated their lives to the development of the science "Vaastu shastra" or "Vaastu", as it is popularly known today.

The principles of the science laid down during those days were based purely on the effect of sunrays during different times of the day. The observations and corrections made were noted and concluded only after in-depth screening of the situation.Vastu is a part of Vedas, which are believed to be four to five thousand years old. Through penance and meditation yogis of that period acquired answers believed to have come from the cosmic mind itself to their questions. Hence Vedas are heeded with divine knowledge.

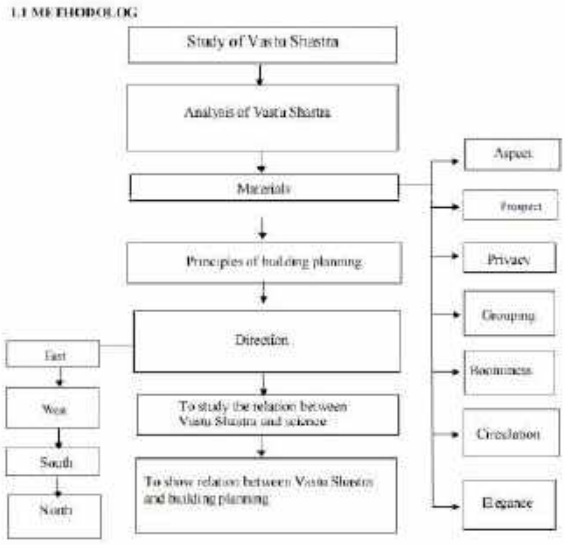
The art of Vastu originates in the Stapatya Veda, a part of the Atharva Veda. The principles of construction, architecture, sculpture etc., as enunciated in the epics and treatise on temple.Vaastu Shastra as a science is applicable to all types of buildings irrespective of their functions, size, scale, and type. Vaastu principles are applicable at the design stage of spaces and areas. It is based on the belief that the physical environment has a direct impact on the health, well-being, and prosperity of the inhabitants.

The principles of Vastu Shastra have been used for centuries in traditional Indian architecture, but in recent years, there has been increasing interest in incorporating these principles into modern architecture.

The incorporation of Vastu Shastra principles into modern architecture can bring several benefits. One of the main benefits is the emphasis on natural elements such as light, air, and water, which can lead to healthier and more energy-efficient buildings. Vastu Shastra also promotes using sustainable materials and construction methods, which can help reduce the environmental impact of buildings. Additionally, the principles of Vastu Shastra can enhance the overall aesthetic and functionality of a building, creating a more harmonious and pleasing environment for the

inhabitant. When designing a space according to Vastu Shastra, you want to make sure the space is in balance with the natural environment. You also want to make sure each side of the space is aligned with the positive energy from each of the directions. Make sure the entrance is not facing north because this direction creates negative energy. You also want to make sure the space is not against a wall. These two, elements create negative energy in a space. By keeping these elements in mind while designing your space, you will be able to create a design that is in harmony with the natural environment and the flow of positive energy. The use of Vastu principles in modern architecture is intended to create a sense of balance and harmony within the built environment, which can lead to improved physical, mental and spiritual well-being for the people who inhabit the space. However, it's important to note that Vastu is not a universally accepted scientific principle, and many architects and builders do not take Vastu into account when designing buildings. Additionally, in the modern context many modern architects and builders use Vastu as a guide to design buildings but also use their understanding and design principles. When designing a space according to Vastu Shastra, you want to make sure the space is in balance with the natural environment. You also want to make sure each side of the space is aligned with the positive energy from each of the directions. Make sure the entrance is not facing north because this direction creates negative energy. You also want to make sure the space is not against a wall. These two, elements create negative energy in a space. By keeping these elements in mind while designing your space, you will be able to create a design that is in harmony with the natural environment and the flow of positive energy.

METHODOLOGY



OBJECTIVES

- To study the Relation in between Vastu Shastra and Science.
- To study the Relation between Nature and Vastu Shastra.

Result and discussion

INTRODUCTION OF VEDAS

• Vedas are holy books.
• The knowledge of Vedas were given by Lord Bramha
• There are four Vedas:-
• Rigveda
• Upaveda : Ayurveda
• Yajurveda
• Upaveda: Dhanurveda
• Saamveda
• Upveda: Gandharvaveda
• Atharvaveda
• Upveda: Sthaptyaveda

VASTU SHASTRA IN DICTIONARY

1) Skandha Purana
2) Garud Purana
3) Agni Purana
4) Narad Purana
5) Other

INTRODUCTION OF ELEMENTS

1) Water
2) Fire
3) Air
4) Earth

Shape Of Land

1) Circular
2) Triangular
3) Half moon
4) Parallelogram
5) L shape
6) T shape
7) Square
8) Rectangular

EFFECT OF NATURAL LAND

1)Bramhani
2) Kshatriya
3) Vaishya
4) Shudra

4. CONCLUSIONS

Vastu Shastra is not a Mythology it is Science and Technique to construct a building. Vastu-compliant

buildings are believed to attract positive energy, resulting in enhanced quality of life. For instance, the strategic placement of windows and doors can significantly influence ventilation and natural light. Numerous case studies showcase the success of buildings designed with Vastu principles, underscoring their impact on occupants' lives.

In conclusion, this paper has delved into the scientific reasoning behind Vastu Shastra principles, aiming to spread awareness and promote the positive impact of this ancient science to a wider audience for the betterment of society. By establishing the relationship between Vastu Shastra and natural phenomena such as the Sun's energy, magnetic forces, and the rotation of the Earth, we have highlighted the scientific underpinnings of Vastu Shastra. Furthermore, this paper offers a comprehensive plan for designing homes in accordance with Vastu Shastra principles, supported by scientific validation. By providing practical guidelines and explanations, we empower individuals to apply Vastu principles in their own living spaces, thereby enhancing their well-being and quality of life. It's crucial to remember a key aspect of Vastu Shastra: the strategic elevation of different sides of the building. The southwest side should be elevated, bearing the weight of heavy structures, and surrounded by closed surroundings. In contrast, the northeast side should be kept at a lower elevation, with open surroundings.This balancing act ensures that the energies flowing from the northeast, considered auspicious and beneficial, are unobstructed and allowed to flourish. Looking ahead, the future scope for research in Vastu Shastra is vast and promising Further studies could explore additional scientific evidence to support Vastu principles, requiring expertise and interdisciplinary collaboration. By continuing to deepen our understanding of Vastu Shastra through scientific inquiry.

Utilization of waste egg shell modified bitumen in hot mix asphalt

Shreyash Kalkutagi[1], Siddhesh Kadam[2], Mandar Potdar[3], Ritesh Sutar[4]
1,2, 3, 4 Students, Department of Civil Engineering, SITCOE, Yadrav, Kolhapur

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Abstract - The utilization of waste materials to modify the performance of bituminous pavement is trending globally. The introduction of egg shell powder as a sustainable modifier is the focus of this study in order to achieve the goals of lowering the weight percentile, cutting expenses, and enhancing the economic viability of hot mix asphalt. One of the latest innovations in construction cost reduction is the use of waste materials, one of which is eggshell as modifier. This research has the interest to introduce the egg shell powder as a sustainable modifier to fulfil the objectives of reducing the weight percentile, reducing costs and improving the economic viability of hot mix asphalt. This research was conducted performing a number of experimental tests on virgin and modified asphalt by adding egg shell powder (2, 4, 6, and 8%) by weight of asphalt to evaluate the physical properties of asphalt cement as well as the mechanical properties of hot mix asphalt. The results of the study demonstrated a decrease in penetration and the ductility value as well as a valuable
increase in flash point versus increasing percent of the waste material. The mechanical tests showed improvement in stability-flow results with increasing egg shell percent. This paper recommends that egg shell can be used successfully for increasing performance of asphalt.

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1. INTRODUCTION

A few years ago, many studies towards the use of alternative materials for road construction and some of them have shown positive and encouraging results. This promoted the use of organic and inorganic materials as modifiers or additives in asphaltic pavement such as plastics, polymers, glass, oils, fibers, etc. With this, not only can solve the problem of the lack of original material in asphaltic pavement construction, but also give alternatives by recycling

process. It is estimated that roughly 100 million tons of hen egg shell is generated throughout the world every year without realizing that it has many uses in other areas, perhaps most distinguishes the eggshell is fit on mineral salts such as calcium, phosphorus, manganese, molybdenum, iron, copper, chromium, fluorine, zinc. The researchers chose this material in order to investigate its effect on bitumen as long as it's having an effect on the chemically cement material. These eggshells waste are non-biodegradable and the majority of eggshell waste is deposited as landfills. Egg-shell waste in landfills attracts vermin due to the attached membrane in landfills and causes problems associated with human health and environment. So this egg-shell waste is useless as a landfill material. However, it aids in project cost reduction and also helps to create a more environmentally friendly workplace.

Material and methodology

BITUMEN

Bitumen is a thick, oily byproduct that is dark black and viscous and is made from hydrocarbon mixes that have had their volatile components removed through natural or manmade processes. Petroleum removes bitumen from fractional distillation while there is air present. A well assembled bituminous mix is chosen as the end product because it is thought to be strong, long lasting, economical, and environmentally benign. The naturally occurring combination obtained through the distillation process. The primary goal is to employ bitumen as a better-quality binder material

that adheres and is waterproof. Because of the bitumen's viscoelastic properties, it is quite easy to cause long-lasting deformation and fissures. Depending on the petroleum source, bitumen's chemical make-up varies. Bitumen is used to build almost 85% of the pavements in the globe, making it a more practical and popular choice. About 5-6% of the overall bitumen mixture is made up of bitumen, which coats and bonds the aggregate particles. It is a naturally occurring combination of hydrocarbons that is often dark brown or black in color.

USES OF BITUMEN

In road construction bitumen can be used in hot mix asphalt and cold mix asphalt on the road surface. Both of these two types of asphalts are used in flexible pavement.In hot mix asphalt, paving grades bitumen which are penetration grade and viscosity grade are used. Bitumen is used in the waterproofing process and rust-proof coating. In the waterproofing process it can be used in different forms of bituminous paint, bituminous membrane and bituminous coating to prevent water penetration into the surfaces.

What is modified Bitumen?

Bitumen Modification is a process that involves adding polymers or chemicals to bitumen to improve its performance and durability. Modified bitumen is made up of asphalt combined with polymerized rubber or plastic, then reinforced with fiberglass to create rugged yet flexible waterproofing membrane and also improved performance, Increased Durability, Enhanced safety, Environmentally friendly.

METHODOLOGY

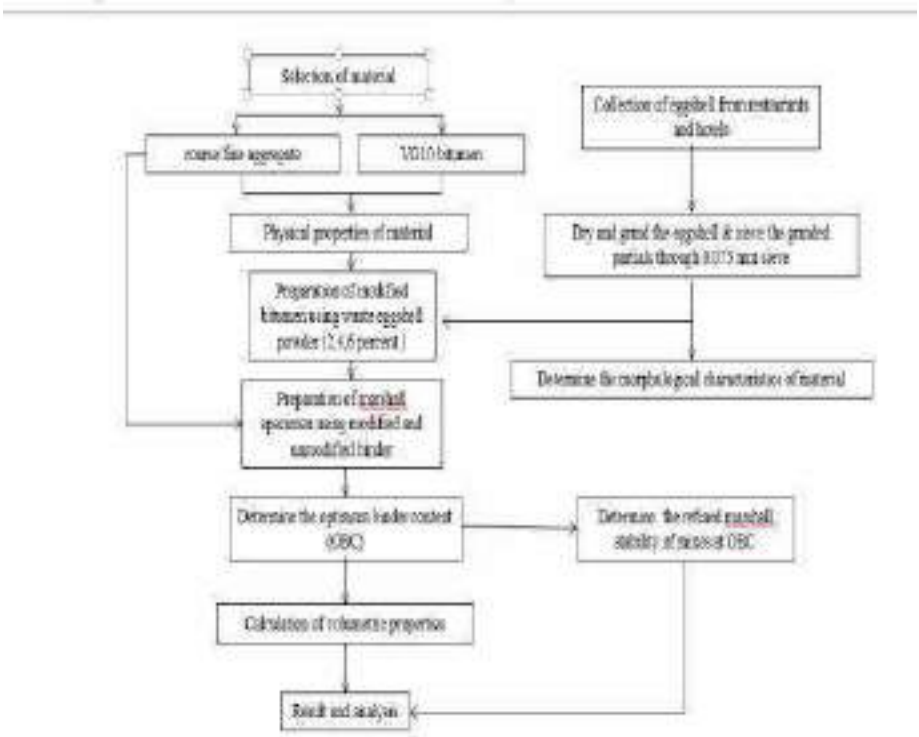


Fig.2 Waste egg Shell

Fig.3 Crushed Eggshell powder

Fig.5 Modified Eggshell powder

Fig.4 Muffle Furnace

Fig.6 Penetration Test

Fig.7 Flash & Fire Test

Fig.8 Ductility Test

3. OBJECTIVES

• To prepare the waste micro and Nano eggshell powder.

• To prepare modified bitumen using eggshell powder.

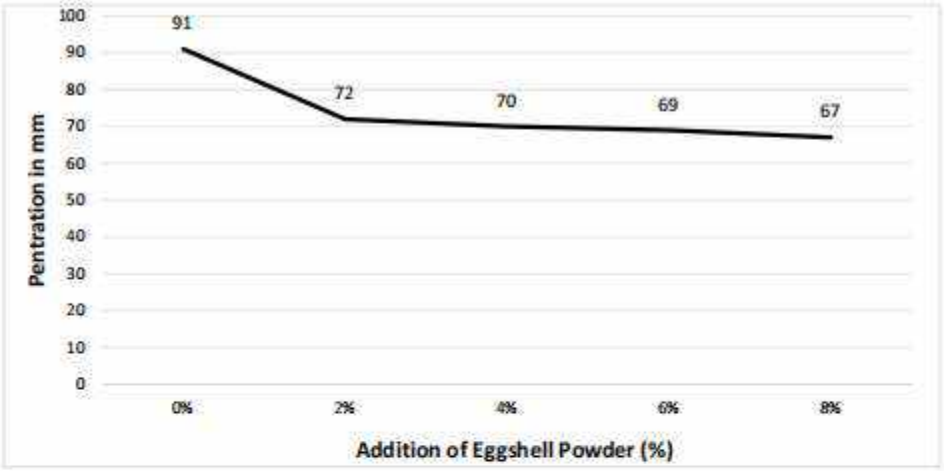
• To determine the engineering properties of unmodified bitumen and eggshell modified bitumen.

Result and discussion

TESTS Adding % of Powder	0%	2%	4%	6%	8%	IS CODE USED
PENETRATION TEST	92 mm 92 mm 90 mm	72 mm 74 mm 70 mm	72 mm 74 mm 70 mm	71 mm 69 mm 70 mm	66 mm 67 mm 69 mm	IS: 1203-1978
DUCTILITY TEST	110 cm 108 cm 109 cm	107 cm 108 cm 107 cm	106 cm 107 cm 105 cm	103 cm 102 cm 101 cm	95 mm 100mm 101mm	IS: 1203-1978
FLASH & FIRE POINT TEST	Fire pt= 280 °C Flash pt=230°C	Fire pt= 280 °C Flash pt.=230 °C	Fire pt= 280 °C Flash pt=230 °C	Fire pt= 280 °C Flash pt=230 °C	Fire pt= 280 °C Flash pt=230 °C	IS: 1203-1978

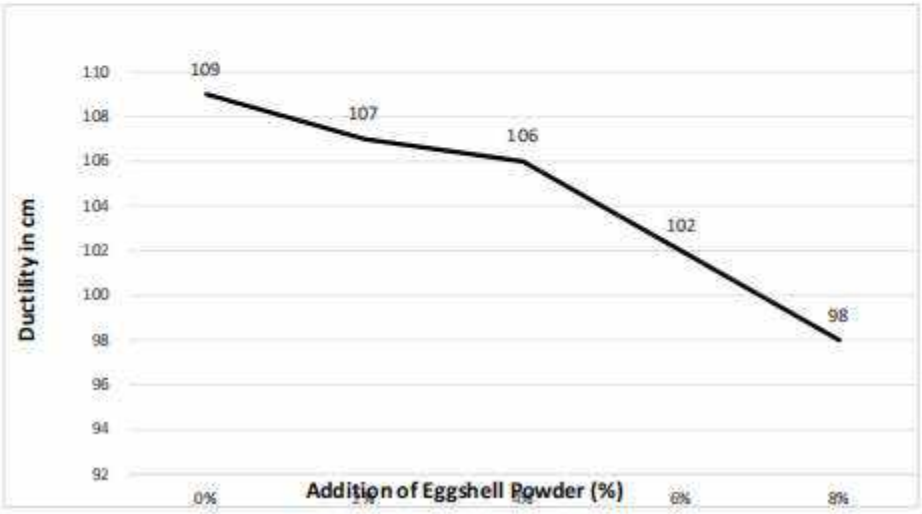
a. Penetration Test

The graphical representation of Penetration value are shown in Fig.



b. Ductility Test

The graphical representation of Penetration value are shown in Fig.



CONCLUSIONS

After the intensive research we have highlighted the following results-

- The Penetration value have decreased by 21%,23%,25% and 27% for the addition eggshell powder by 2%,4%,6% and 8% respectively.
- The Ductility value have decreased by 3%, 4%, 7% and 8% for the addition eggshell powder by 2%, 4%,6% and 8% respectively.
- The Flash and Fire point mostly not changed and remains same.

Effect Of Nano-Silica In Performance Of Recycled Aggregate Concrete

Hrushikesh Mali [1], Ritesh Patil[2]
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Abstract - The effect of recycled coarse aggregate in nano silica solution on the properties of recycled aggregates concrete is compared with the direct mixing of NS in concrete. In this study, four series of concrete are considered. The first and second series are control series containing 100% natural coarse aggregate (NCA) and 100% RCA, respectively. The third and fourth series are similar to the second series in every aspect except that 2 wt% NS is added through direct mixing in concrete and presoaking of RCA in 2 wt% NS solution of 24 hr, respectively. Results show that the measured 7-day compressive strength of recycled aggregate concrete containing presoaked RCA is higher than that containing direct mixing of NS in concrete. The total porosity of mortar adjacent to RCA is also found to be significantly lower than the same, where NS is mixed directly. The concentration of pores in the matrix adjacent to RCA is also shifted to medium capillary pores from the large capillary pores of matrix adjacent to RCA containing no NS. The volume of medium capillary pores reduced significantly in the matrix adjacent to presoaked RCA compared to the same, where NS is mixed directly.

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1. INTRODUCTION

Reprocessing into coarse aggregates of concrete is a sustainable solution for the disposal of construction and demolition (C&D) waste. The use of recycled coarse aggregates however leads to a degradation in the resulting concrete, which then limits the use of recycled aggregate concrete (RAC) in structural elements. However, both the compressive strength and elastic modulus of RAC are generally lower than that of normal natural aggregate concrete. Due to this, the use of nano-silica into recycled aggregate concrete can enhance the performance of concrete.

METHODOLOGY

- Collection of materials

- Determining the properties of materials like cement and aggregate.
- Preparation of mix at different proportion by replacing the cement with nano silica with 0%, 2%, 4%, 6% and 8%.
- Testing for determining the performance of block.

Collection of materials

OBJECTIVES

- To study the characteristic of nano-silica used in concrete.
- To determine the properties of Recycled aggregate.
- To determine the performance of recycled aggregate concrete with nano-silica.
- To study the strength of concrete

Result and discussion

Table 1: Compressive test of Concrete cube

Sample No	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)	Avg
1	21/08/24	22500	220	9.78	13.93
2	21/08/24	22500	348	15.4	
3	21/08/24	22500	375	16.6	

Table 2: Compressive test of Concrete cube with Recycled Aggregate

Sample No	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)	Avg
1	21/08/24	22500	186	8.26	9.28
2	21/08/24	22500	210	9.33	
3	21/08/24	22500	240	10.26	

Table 3: Compressive test of Concrete cube with 2% Nano Silica

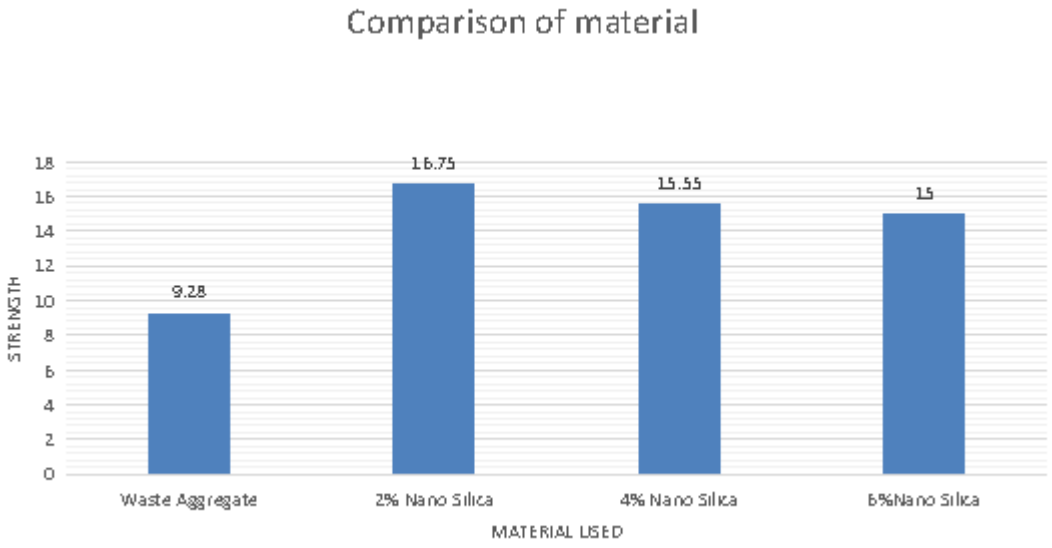
Sample No	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)	Avg
1	21/08/24	22500	369	16.4	16.75
2	21/08/24	22500	376	16.71	
3	21/08/24	22500	386	17.15	

Table 4 : Compressive test of Concrete cube with 4% Nano Silica

Sample No	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)	Avg
1	21/08/24	22500	357	15.86	15.55
2	21/08/24	22500	342	15.2	
3	21/08/24	22500	351	15.6	

Table 5 : Compressive test of Concrete cube with 6% Nano Silica

Sample No	Date of test	Area (mm2)	Max. Load (KN)	Strength (N/mm^2)	Avg
1	21/09/24	22500	321	14.26	15
2	21/09/24	22500	336	14.93	
3	21/09/24	22500	356	15.82	



CONCLUSIONS

It is concluded that the waste aggregate is not as strong as different percentages of nano silica. The 2% nano silica cube exhibits a superior strength compared to the 4%, and 6% nano silica, while the 2% and 4% nano silica are comparable in strength

Smart sensor placement for thermal monitoring of concrete

Sakshant Mane [1], Yash Kalkutagi [2], Rohan Kalubarme [3], Sanyam Upadhye [4]

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Abstract - Structural health monitoring (SHM) has become an inevitable part in a life span of a structure due to its potential to ensure the public safety and to increase the life span of the structure. Monitoring any kind of structures for various parameters, using wireless smart sensors has gained popularity in recent past. This paper discusses the development of low cost real time wireless smart sensor monitoring system to monitor early age concrete temperature in real time. Temperature of two early age concrete mixes (Mix1, Mix2) were measured in real time for 24 hours by using DS18B20 sensors connected with the Node Mcu, which is an open source IOT platform. Temperature measurements were saved and visualized in real time using Thing SpeakTM which is an open IoT online platform with MATLAB analytics. The temperature sensor DS18B20 was selected such that it is suitable to measure temperature readings of the concrete without any interference of the chemical reactions in concrete. Calibration methods and temperature variation with different concrete mixesare also discussed. It could be seen that the wireless temperature monitoring system performed adequately and it can be considered as a better low cost alternative for traditional wired temperature monitoring system.

INTRODUCTION

Structural health monitoring (SHM) is one of the rapidly growing domains in civil engineering, which aims to assess the behavior of the structures and evaluate the performance of the materials during their life cycles. SHM involves the sensors, data transmission, computational power and processing inside the structure. Sensors play vital role in SHM and there are lot of studies going on sensors and its properties. Various sensors are used assess the environmental impact, temperature, humidity etc. SHM is mainly performed for critical structures like bridges, wind turbines, tunnels etc. SHM improves the understanding of field structural behavior and detect damages at early age on other hand it has high installation cost and are vulnerable to the earthquake conditions, as the size and complexity of the structure increases the difficult the SHM becomes. Nowadays use of temperature sensor is increasing to monitor the concrete structure, this helps in checking the maturity of concrete. If we get the maturity before the time period work will be done as early as possible. For big construction works they don't have more time to leave 28 days after one slab if they do like that their project gets delayed. To place the sensors in the concrete it costs more if they don't know the placement then they may run out of budget. In sensor optimization the usual objective is to minimize the sensor placements, is the sensor cost. There

are several articles devoted to study of the design of sensor networks. Aside from the cost other objective function such as precision simply observability or reliability are important.

Material

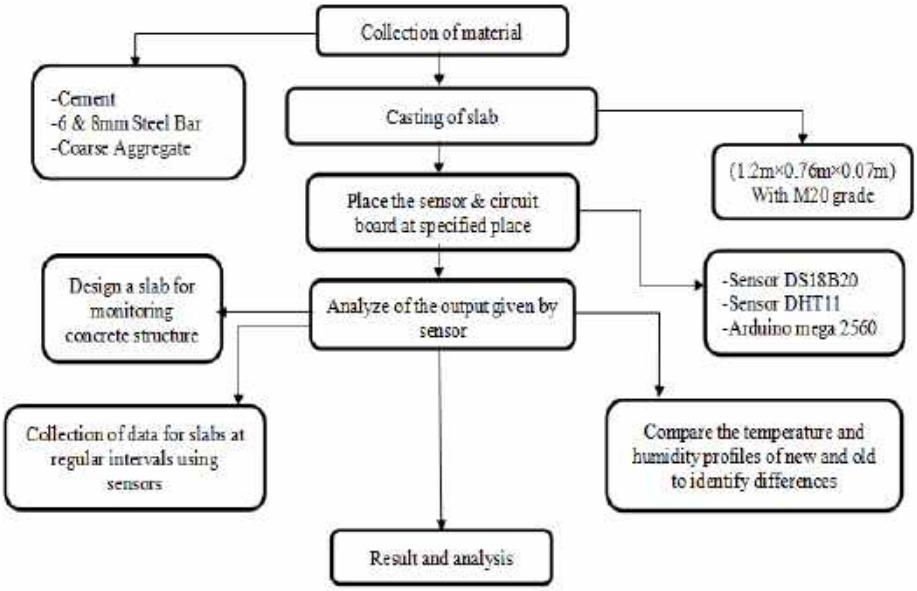
Material-

- 6mm & 8mm Steel Bar
- Binding Wire
- Cement
- Coarse Aggregate
- M Sand
- DS18b20 Waterproof digital temperature sensor
- DHT11 Humidity temperature sensor
- Arduino Nano

Consumption of Material

Sr.No	Material	Quantity
1)	Cement	25 Kg
2)	20mm Coarse Aggregate	50 Kg
3)	M Sand	70 Kg
4)	Water	30 lit
5)	6mm Steel bar	1 Nos.
6)	8mm Steel bar	1 Nos.

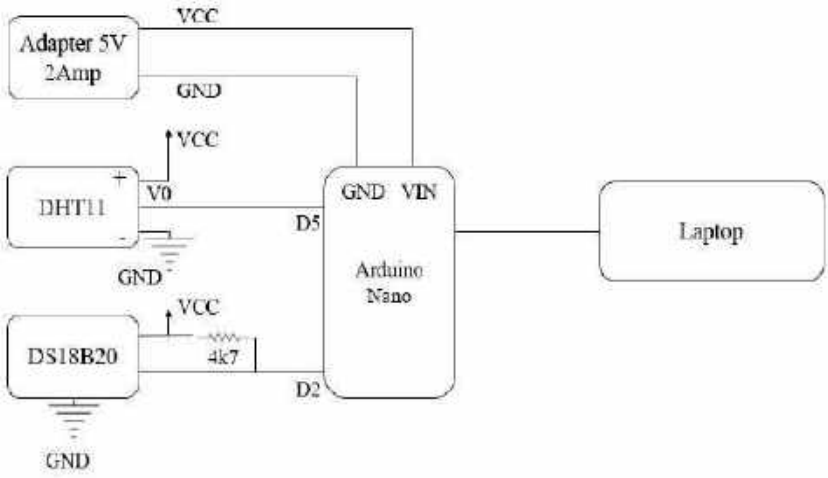
Methodology



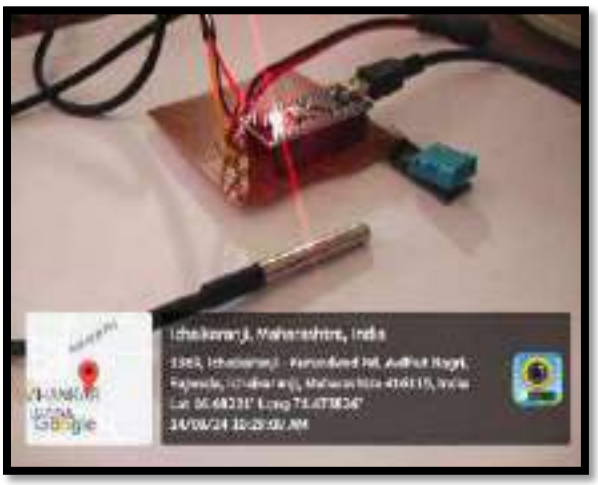
Slab Casting

After 21 days curing slab

Circuit diagram



Circuit diagram assembly



Used Software-

- Use language C++
- arduino IDE

Used Code-

```
#include "DHT.h"

#define DHTPIN 5

#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

#include <OneWire.h>

#include <DallasTemperature.h>

int x = 15;    // Change time as per requried in minutes

float t, h, tempC;

// Data wire is plugged into port 2 on the Arduino

#define ONE_WIRE_BUS 2

// Setup a oneWire instance to communicate

OneWire oneWire(ONE_WIRE_BUS);

// Pass our oneWire reference to Dallas Temperature.

DallasTemperature sensors(&oneWire);

//------------------------------------------------

void setup(void)

{

 Serial.begin(9600);

 sensors.begin();

 dht.begin();
```

```
  Serial.print("Slab Temperature in *C: ");
  Serial.print(F("\tAir Humidity in %: "));
  Serial.print(F("\tAir Temperature in *C: "));
}
//---------------------------------------------
void loop(void)
{
  //Serial.print("Requesting temperatures...");
  sensors.requestTemperatures(); // Send the command to get temperatures
  //Serial.println("DONE");
  tempC = sensors.getTempCByIndex(0); // Check if reading was successful
  Serial.print("\n");
  Serial.print(tempC);
  h = dht.readHumidity();// Read temperature as Celsius (the default)
  t = dht.readTemperature();
  Serial.print("\t");
  Serial.print(h);
  Serial.print("\t");
  Serial.println(t);
  //delay(5000);
  delay(x*60*1000UL);}
```

Monitoring of Slab

a) New Slab-

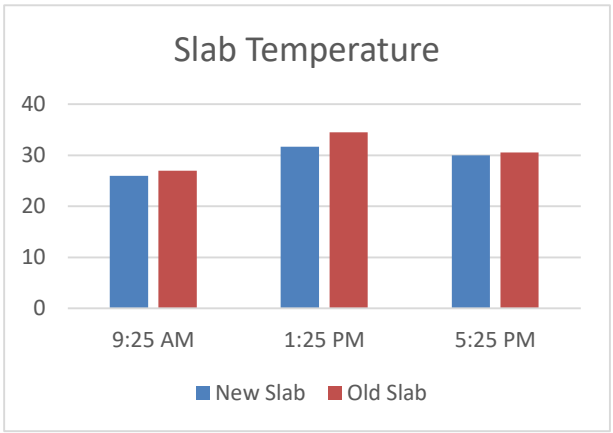
b) Old Slab-

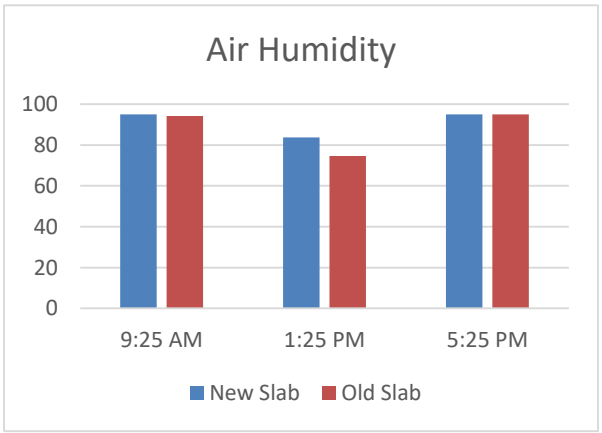
OBJECTIVES

- Design a slab for monitoring concrete structure
- Collection of data for slabs at regular intervals using sensors
- Compare the temperature and humidity profiles of new and old to identify differences

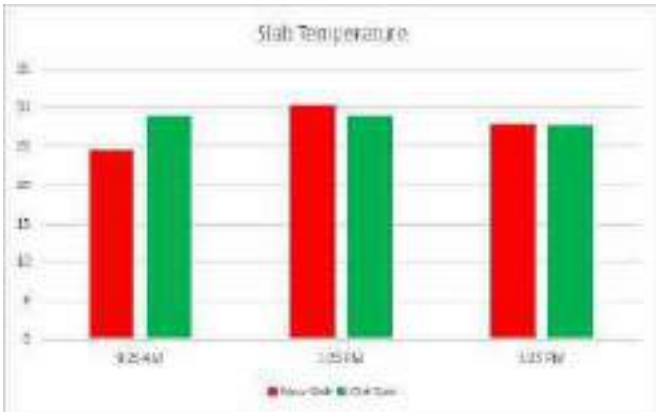
RESULTS

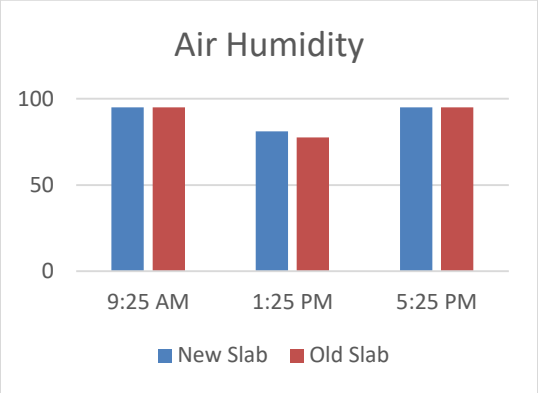
Day 1



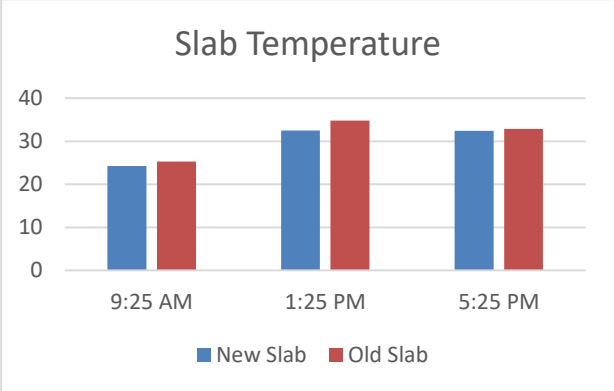


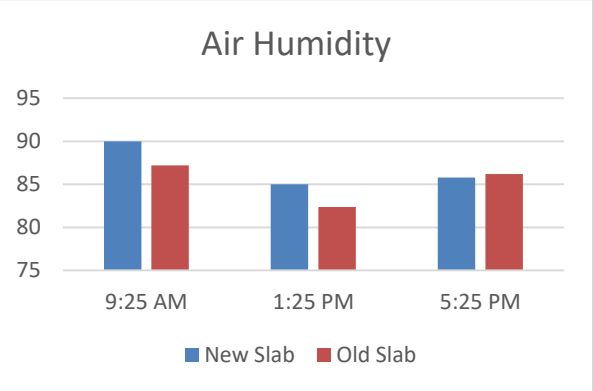
Day 2-





Day 3





CONCLUSIONS

- As compared to morning slot and evening slot, temperature (inside) is more in slab having life more than 20 years. (Ref. Graph No. 1.1, 2.1, 3.1).
- Due to temperature and weather changes Air humidity is also slightly more in afternoon slot than morning and evening slot. (Ref. Graph No. 1.2, 2.2, 3.2).

Improving Properties of laterite bricks by using Nano-silica .

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Abstract: This study investigates the enhancement of laterite brick properties through the incorporation of nano-silica. Laterite bricks, known for their eco-friendly and cost-effective characteristics, often face challenges such as low strength and durability. By adding nano-silica, the research aims to improve compressive strength, water resistance, and overall performance of the bricks. Experimental results demonstrate that nano-silica enhances the microstructure of laterite, leading to improved mechanical properties. This work highlights the potential of nano-silica as a valuable additive in sustainable construction materials.

Introduction

Laterite is a soil type rich in iron and aluminum and is commonly considered to have formed in hot and wet tropical areas. Nearly all laterites are of rusty-red coloration, because of high iron oxide content. They develop by intensive and prolonged weathering of the underlying parent rock, usually when there are conditions of high temperatures and heavy rainfall with alternate wet and dry periods. The process of formation is called laterization. Tropical weathering is a prolonged process of chemical weathering which produces a wide variety in the thickness, grade, chemistry and ore mineralogy of the resulting soils. The majority of the land area containing laterites is between the tropics of Cancer and Capricorn.

Laterite has commonly been referred to as a soil type as well as being a rock type. This, and further variation in the modes of conceptualizing about laterite (e.g. also as a complete weathering profile or theory about weathering), has led to calls for the term to be abandoned altogether. At least a few researchers specializing in regolith development have considered that hopeless confusion has evolved around the name. Material that looks highly similar to the Indian laterite occurs abundantly worldwide.

Historically, laterite was cut into brick-like shapes and used in monument-building. After 1000 CE, construction at Angkor Wat and other southeast Asian sites changed to rectangular temple enclosures made of laterite, brick, and stone. Since the mid-1970s, some trial sections of bituminous-surfaced, low-volume roads have used laterite in place of stone as a base course. Thick laterite layers are porous and slightly permeable, so the layers can function as aquifers in rural areas. Locally available laterites have been used in an acid solution, followed by precipitation to remove phosphorus and heavy metals at sewage-treatment facilities.

Laterites are a source of aluminum ore; the ore exists largely in clay minerals and the hydroxides, gibbsite, boehmite, and diaspore, which resembles the composition of bauxite.

In Northern Ireland they once provided a major source of iron and aluminum ores. Laterite ores also were the early major source of nickel.

Laterite bricks are widely used in several parts of India, including Kerala, Karnataka and Andhra Pradesh. They are commonly used for constructing walls, foundations, and other structures. This highly compacted and cemented soil can easily be cut into brick-shaped blocks for building. laterites are of rusty-red coloration, because of high iron oxide content. Laterite bricks are acquired from the mines of laterite crusts and then further they are converted into laterite stones with machine cut method.

Nano-silica is a powder material of particle size <100nm. It features as light and fluffy in volume and high chemical activity. As it contains OH- bond on the surface, nano-silica is an acid oxide belonged to acid radical of silicate, and hydrophilic with above 5 times water absorption than itself.

Objectives

1) Study the properties of laterite Brick & Nano-silica.

2) Analysis the strength and other important properties of laterite brick by applying nano-silica.

3) Preparation of blocks by using laterite waste and nano silica.

4) Compare and analysis of normal concrete block with the proposed laterite block

Material

Laterite bricks are a type of construction material commonly used in India. They have been used in India for centuries and are still popular today. Made from laterite soil, which is abundant in many parts of the country, these bricks are known for their durability and strength. One of the main advantages of laterite bricks is their cost-effectiveness. They are relatively inexpensive compared to other building materials, making them a popular choice for affordable housing projects. Moreover, laterite bricks are environmentally friendly as they are made from locally available soil, reducing the need for transportation and minimizing carbon emissions.

Silica powder

Nano silica, or nano silica, consists of silicon dioxide (Si O_2) particles that are on the nanometer scale, typically ranging from 1 to 100 nanometers. Due to their extremely small size and high surface area, these particles exhibit unique properties such as increased reactivity and strength compared to larger silic

Cement

Cement is defined as a binding agent that is used to bind various construction materials due to its adhesive and cohesive properties. It is an essential ingredient of concrete and mortar. Cement is mixed with water to form a paste that binds aggregates like sand or crushed rocks. Calcium, silicon, iron and aluminum compounds are closely ground to form a fine powdered product

Material Collected

1. Laterite Brick
2. Nano-silica
3. Cement
4. Laterite waste

Testing of Material

- Laterite Soil – 5 (Acidic)
- Nano Silica – 8 (Alkaline)
- Cement – 14 (Alkaline)
- Mix – 12(Alkaline)

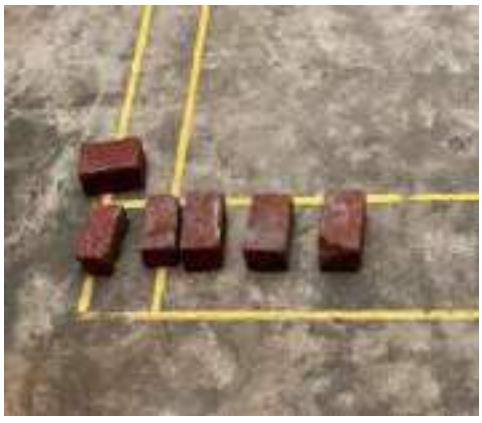
Methodology

1. Collection of material
2. Application of prepared mix on stone
3. Preparation of Block
4. Testing properties
5. Comparison

Application of prepared mix on stone Injecting mixture in Brick**.**

Application of prepared mix on stone Injecting mixture in Brick

Curing of Brick



Drying of Brick

Weight of brick Before and after Curing

Testing of Brick

Result and Discussion

Water Absorption Test

Sr. No	Weight Before Curing(Kg)	Weight After Curing(Kg)	Water Absobtion Ratio
1	21.125	22.105	4.44%
2	22.255	23.225	4.18%
3	29.170	30.170	3.32%
4	31.055	32.275	3.79%
5	31.520	32.645	3.45%

	Weight Before Curing	Weight After Curing	Water Absobtion Ratio
Normal Brick	30.175	32.565	7.34%

Compressive Strength Test

- Dimensions of Bricks- L=250mm, B=220mm, H=160mm

Sr.No	Compressive Strength (N/mm2)
Normal Brick	7.36

Sr. No	Compressive Strength (N/mm2)	% of Nano Silica
Brick 1	7.49	10%
Brick 2	8.4	20%
Brick 3	9.81	30%
Brick 4	10.90	40%
Brick 5	10.92	50%

Laterite Waste Collection and Particle Size Distribution.

Water Absorption test results of proposed brick

Sr. No	Weight Before Curing(Kg)	Weight After Curing(Kg)	Water Absorbtion Ratio	Nano Silica %
Brick 1	7.220	7.305	1.16	0%
Brick 2	7.145	7.225	1.10	2%
Brick 3	7.145	7.230	1.17	3%
Brick 4	7.150	7.240	1.24	5%

Compressive Strength Test

Sr. No	Compressive Strength (N/mm2)	% of Nano Silica
Normal Brick	12.70	-
Brick 1	13.11	2%
Brick 2	14.53	3%
Brick 3	14.80	5%

Normal Concrete Block	**9.64 N/mm2**

Conclusion

As per result and discussion 30% to 40% nano silica with cement addition gives better result for laterite stone brick. 3% silica with cement gives better result for laterite waste block. It will also concluded that acidity of laterite also reduces by using nano silica and cement into mixture.

Porous concrete with using over burnt brick

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Abstract - In the search of alternate construction materials, over burnt brick aggregate has enrolled its appellation as a low cost sustainable alternate material. In the north-eastern part of India, especially in Tripura, the shortage of natural stone aggregate has opened up the field for over burnt brick aggregate to be used as an alternate pavement material. This study mainly focuses on the characterization of pervious concrete mixes produced with over burnt brick as coarse aggregate. Pervious concrete, in the recent era, has been considered as the emergent technology due to its prominence as an environmentally and hydrologically sustainable pavement system. In this paper, a series of test samples are produced using various design variables and then the mechanical strength and the pore properties of porous mixes are evaluated. Aggregate gradation, water-cement ratio and the percentage of fine aggregate are chosen as the design variables and their effect in the compressive strength, tensile strength, flexural strength, porosity, permeability, etc. are estimated. The statistical analysis is also carried out using the experimental test data and prediction equations are developed to estimate the porosity, permeability and the compressive strength of the pervious concrete mixes. The predicted equations fitted well and showed a very good agreement with the calculated results. These equations can be directly used for the selection of the mix proportion and the designing of pervious concrete mixes made with over burnt brick aggregate.

INTRODUCTION

Porous concrete renowned for its ability to mitigate storm water runoff, reduce urban heat island effects, and promote sustainable urban drainage systems, has emerged as a pivotal solution in contemporary civil engineering. Over burnt bricks, a byproduct of traditional brick-making processes, have recently garnered attention as a potential ingredient in porous concrete mixtures. This introduction explores the integration of over burnt bricks in porous concrete formulations, highlighting its environmental benefits, structural properties, and implications for sustainable infrastructure development**.** Porous pavement or permeable pavement is an engineered hardscaping surface that allows water to flow through it. This differs from traditional types of pavement, which are impermeable and convert most rainfall to runoff. Porous concrete, also known as pervious or permeable concrete, is designed to facilitate water drainage through its structure. With a high void content—typically between 15% and 25%—this type of concrete effectively manages storm water runoff, mitigates flooding risks, and supports groundwater recharge. These characteristics are increasingly vital in urban environments where impervious surfaces lead to increased water accumulation and drainage issues.Over burnt bricks, produced as a byproduct of the brick manufacturing process, often end up in landfills due to their perceived defects resulting from excessive firing in kilns. However, these bricks possess unique properties that can significantly enhance the performance of porous concrete. Their high compressive strength, durability, and thermal mass make them an attractive material for construction,

providing an opportunity to turn waste into a valuable resource.

MATERIAL

Cement

Ordinary Portland Cement (OPC) is commonly used. It will acts as the binding agent, providing strength and durability to the concrete mix.

Crushed Over-Burnt Bricks

Size: Should be crushed to a uniform size 20mm. Properties: Lightweight, high porosity, and good thermal insulation.

Coarse Aggregate

Options: Can include gravel, crushed stone, or additional lightweight aggregates. Provides bulk and structural support.

Fine Aggregate

Type: Natural sand or crushed stone dust.

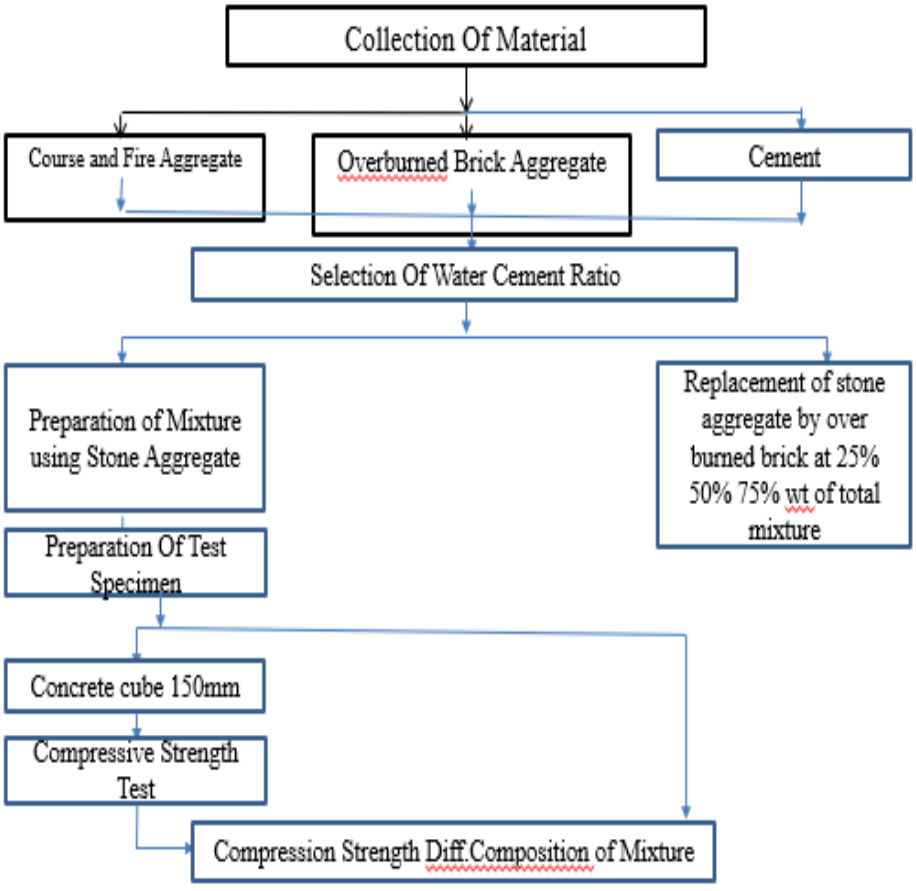
Water

Water should be clean and free from impurities. Activates the cement and aids in hydration.

Admixtures (Optional)

Super plasticizers: Improve workability and reduce water content

METHODOLOGY



PROCEDURE

1. Collecting the Aggregates and over burnt brick pieces.

2. The sample is sieved by using Mesh.

3. Mixing of materials

Collecting the Aggregates and over burnt brick pieces

Sieving Mixing of materials

Preparation of Block

Test conducted

Aggregate Impact Test

Aggregate Crushing Test

Result of Aggregate Crushing Test

W1	858 gm
W2	1.039 gm
W3	856 gm
W4	559 gm

W5 = (W4/W3) x 100 = 6.410 %

Remark: Exceptionally Strong.

Result of Aggregate Crushing Test

Aggregate Crushing Value	10 %
Brick Crushing Value	12.26 %

COMPRESSIVE STRENGTH TEST

Table showing Compressive strength (25% stone and 75% brick) for 7,14 and 21 days curing

Sample No	Dimension (mm)			% of Stone	% of Brick Bond	Days Of Curing	Area (mm2)	Max. Load (KN)	Strength (N/mm2)
	L	H	W						
1	150	150	150	25%	75%	7 Days	22500	330	14.66
1.1	150	150	150	25%	75%	14 Days	22500	373	16.55
1.2	150	150	150	25%	75%	21 Days	22500	405	18

Table showing Compressive strength (50% stone and 50% brick) for 7,14 and 21 days curing

Sample No	Dimension (mm)			% of Stone	% of Brick Bond	Days Of Curing	Area (mm2)	Max. Load (KN)	Strength (N/mm2)
	L	H	W						
2	150	150	150	50%	50%	7 Days	22500	300	13.33
2.1	150	150	150	50%	50%	14 Days	22500	337	15
2.2	150	150	150	50%	50%	21 Days	22500	374	16.66

Table showing Compressive strength (75% stone and 25% brick) for 7,14 and 21 days curing

Sample No	Dimension (mm)			% of Stone	% of Brick Bond	Days Of Curing	Area (mm2)	Max. Load (KN)	Strength (N/mm2)
	L	H	W						
3	150	150	150	75%	25%	7 Days	22500	420	18
3.1	150	150	150	75%	25%	14 Days	22500	440	19.55
3.2	150	150	150	75%	25%	21 Days	22500	490	21.05

Table showing Compressive strength (100% stone) for 7,14 and 21 days curing

Sample No	Dimension (mm)			% of Brick Bond	Days Of Curing	Area (mm2)	Max. Load (KN)	Strength (N/mm2)
	L	H	W					
4	150	150	150	100 %	7 Days	22500	140	6.22
4.1	150	150	150	100 %	14 Days	22500	180	8
4.2	150	150	150	100 %	21 Days	22500	250	11.11

CONCLUSIONS

- Addition of 75% Stone Aggregate and 25% Brick Bond ,the compressive strength is 21.05N/mm $^{2.}$
- Which is the best suitable mix among other combination of mixes.

Effect of different supplementary cementitious materials on concrete workability

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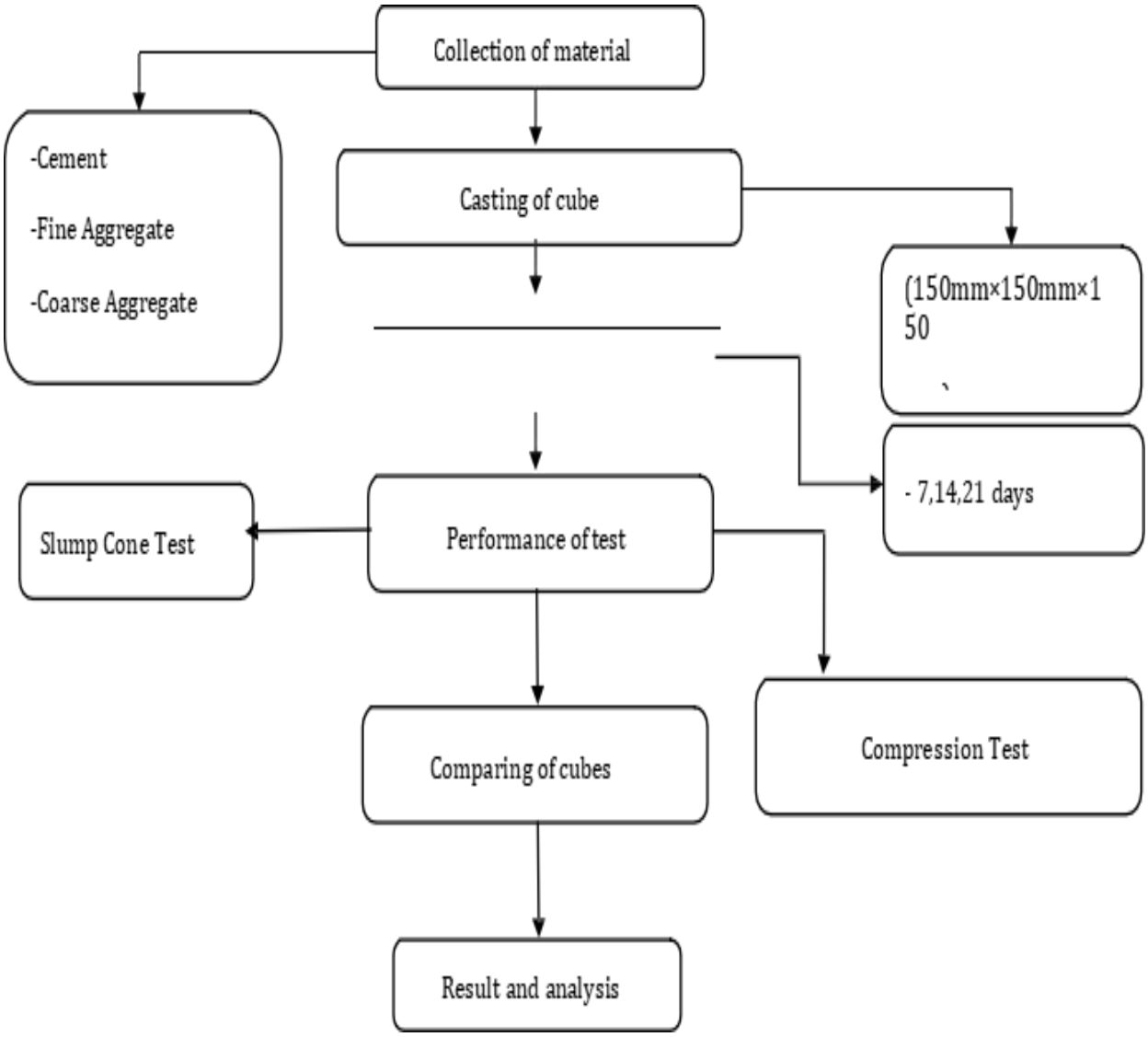
Abstract - Supplementary cementitious materials (SCMs)are used for to increase the strength of concrete. The supplementary cementitious materials like fly ash and GGBS (ground-granulated blast-furnace slag) are using in this project. Supplementary cementing materials hardened concrete through pozzolanic activity. In this project the comparing of regular concrete block with Supplementary cementitious materials like fly ash and GGBS (ground-granulated blast-furnace slag). The quantity of fly ash and GGBS is 0%, 10%, 20% and 30%. To compare the block taking the test like workability and strength test. For workability the slump cone test is taken and for strength test the compression test is taken. Portland cement has a high carbon footprint. Using alternative Supplementary cementitious materials for block production might reduce the carbon footprint and price.

INTRODUCTION

Cement is the most used material in the construction industry and is the second most highly used substance in the world. The demand for Portland cement is increasing day-by-day, and thus the cement industry has increased production of cement. Meanwhile, CO_2 emission footprint in the environment is mainly due to the production of cement, because the cement industry emits 850 kg of CO_2 per ton of clinkers . Therefore, SCMs have been used as cement replacement materials in consideration of the environmental factor.The performance of concrete can be augmented by adding various SCMs. Furthermore, most SCMs are industrial waste products, i.e., fly ash, (FA), rice husk ash, (RHA), ground-granulated blast-furnace slag (GGBFS), silica fume (SF), etc. The addition of SCMs in the concrete not only minimizes the cement content, but also reduces costs and environmental pollution.The main focus of this review is to demonstrate the effects of supplementary cementitious materials [SCM] on the physical, mechanical and durability properties.

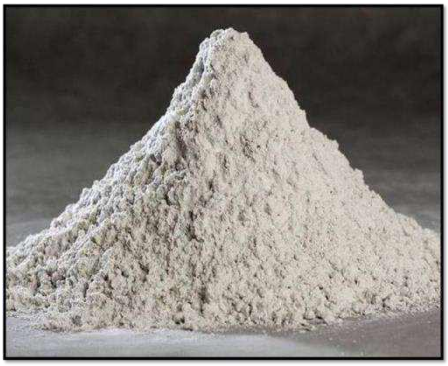
1. METHODOLOGY



OBJECTIVES

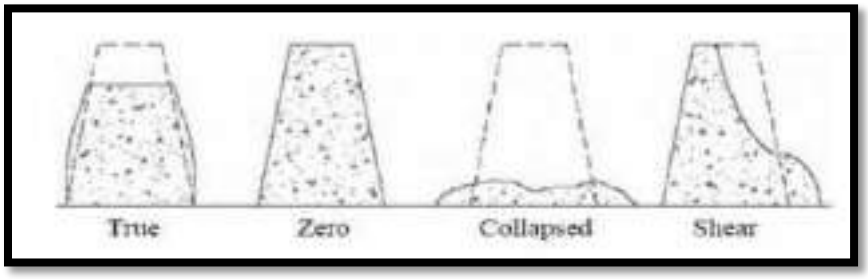
- Development of concrete of grade M20 using various supplementary cementations materials.
- Use of various supplementary cementations materials in concrete.
- Compare the strength with different proportion of supplementary cementations materials.
- Compare the workability of various mixes.

Material Used



Methodology

Result and discussion



Workability	Compaction Factor	Slump (mm)
Very Low	0.78	0 - 25
Low	0.85	25 - 50
Medium	0.92	50 - 100
High	0.95	100 - 175

1. **Concrete block**

Sample	Slump Height (mm)	Type of slump
1	78	Shear
2	64	Shear

2. 10% Fly ash

Sample	Slump Height (mm)	Type of slump
1	89	Shear
2	83	Shear

3. 20% Fly ash

Sample	Slump height (mm)	Type of slump
1	86	Shear
2	74	Shear

4. 30% Fly ash

Sample	Slump height (mm)	Type of slump
1	119	True
2	91	Shear

5. 10% GGBS

Sample	Slump height (mm)	Type of slump
1	89	Shear
2	86	Shear

6. 20% GGBS

Sample	Slump height (mm)	Type of slump
1	73	Shear
2	97	Shear

7. 30% GGBS

Sample	Slump height (mm)	Type of slump
1	86	Shear
2	91	Shear

Compression Test

Table 1.1:Concrete cube test report

Sample No	Dimensions (mm)			Date of cast	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)
	L	H	W					
1	150	150	150	25/04/24	03/05/24	22500	217	9.64
2	150	150	150	25/04/24	10/05/24	22500	350	15.6
3	150	150	150	25/04/24	20/04/24	22500	378	16.8

Table 1.2 Fly Ash 10% test report

Sample No	Dimensions (mm)			Date of cast	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)
	L	H	W					
1	150	150	150	31/07/24	21/08/24	22500	298	13.24
2	150	150	150	31/07/24	21/08/24	22500	261	11.6
3	150	150	150	31/07/24	21/08/24	22500	390	17.33

Table 1.3 Fly Ash 20% test report

Sample No	Dimensions (mm)			Date of cast	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)
	L	H	W					
1	150	150	150	03/08/24	21/08/24	22500	312	13.86
2	150	150	150	03/08/24	21/08/24	22500	317	14.09
3	150	150	150	03/08/24	21/08/24	22500	329	14.62

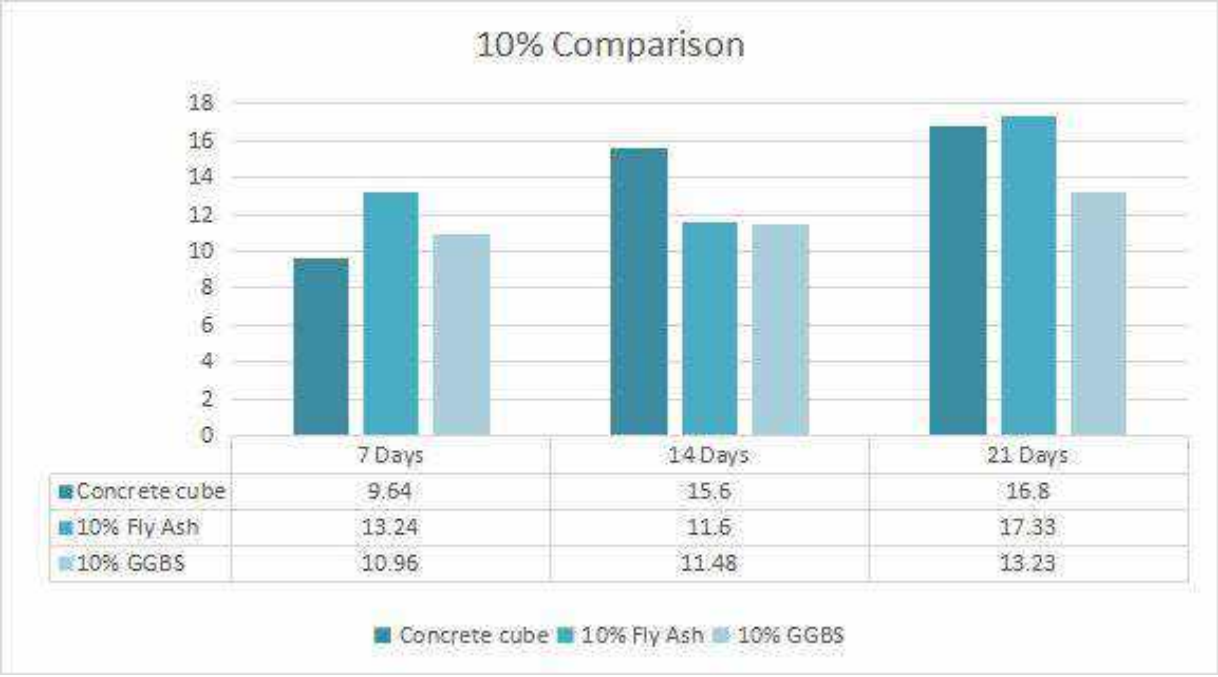
Table 1.4 Fly Ash 30% test report

Sample No	Dimensions (mm)			Date of cast	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)
	L	H	W					
1	150	150	150	06/08/24	21/08/24	22500	335	14.88
2	150	150	150	06/08/24	21/08/24	22500	332	14.75
3	150	150	150	06/08/24	21/08/24	22500	336	15

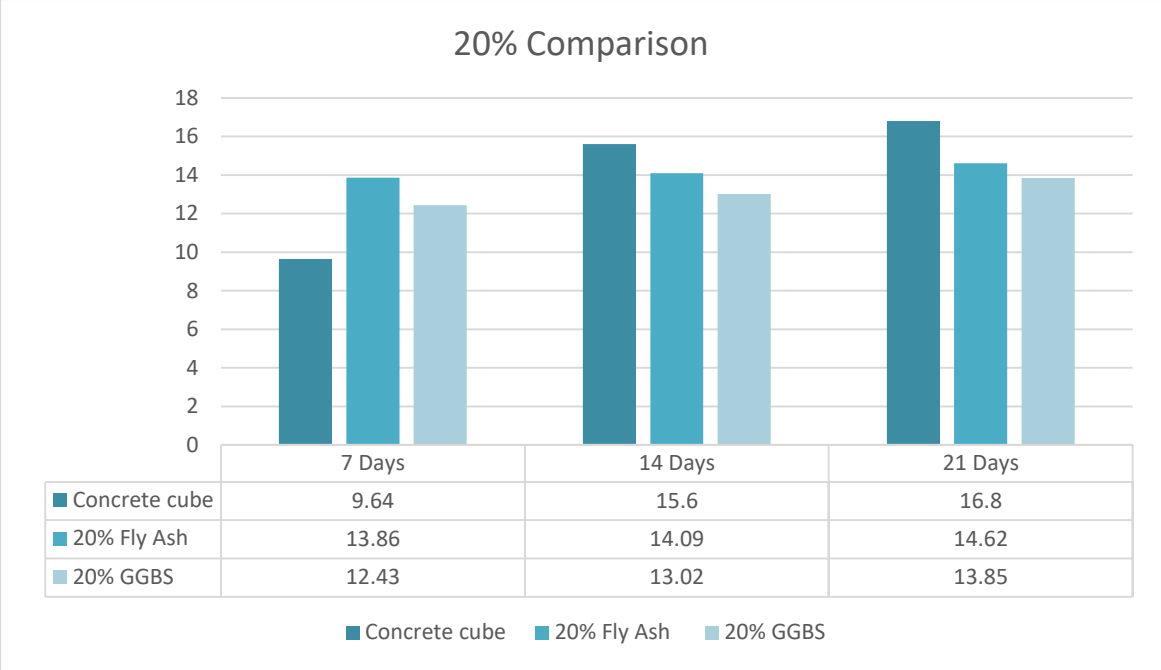
Table 1.7 GGBS 30% test report

Sample No	Dimensions (mm)			Date of Cast	Date of test	Area (mm^2)	Max. Load (KN)	Strength (N/mm^2)
	L	H	W					
1	150	150	150	01/10/24	22/10/24	22500	291	15.79
2	150	150	150	01/10/24	22/10/24	22500	342	15.23
3	150	150	150	01/10/24	22/10/24	22500	355	15.79

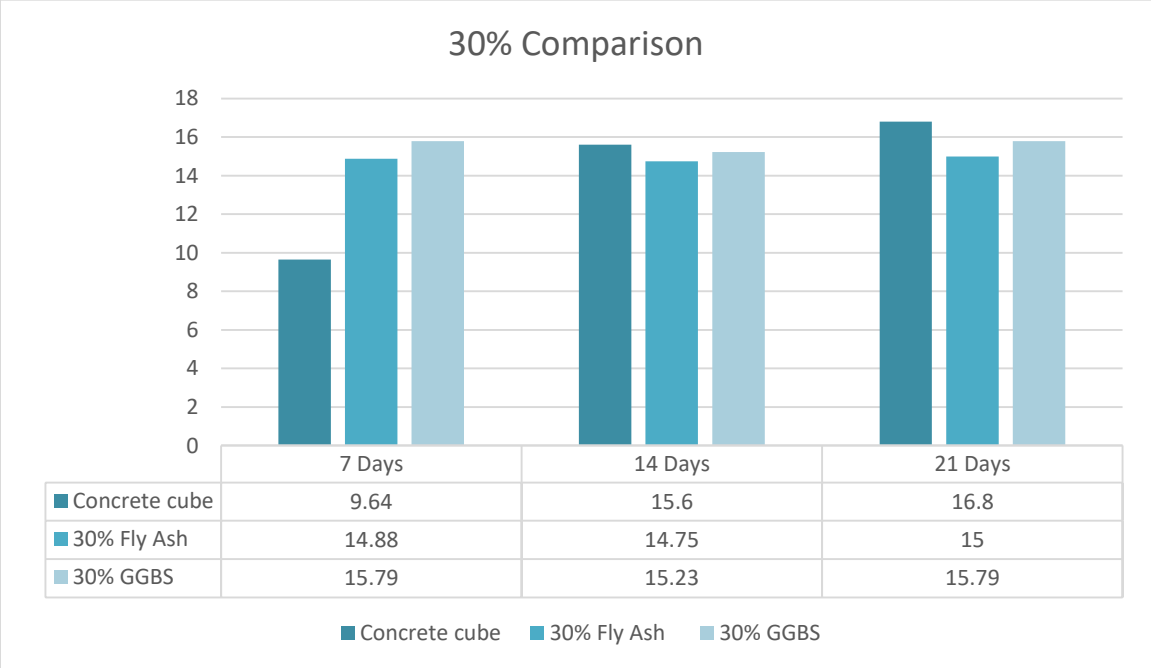
- **Comparison Between Cube**



Comparison Between 10% materials



Comparison Between 20% materials



Comparison Between 30% materials

CONCLUSIONS

- **Strength**

Concrete cubes gain 65% of their strength after seven days and 90% after 14 days, and are considered fully strong after 21 days. Fly ash cubes of 10% fly ash develop compressive strength the fastest at 7 days and decreases at 14 days. Fly ash cubes with 10% fly ash develop strength up to 21 days.

Then the 20% fly ash cubes increase their strength by 7 days, 14 days, and 21 days. Similarly, 30% fly ash cubes increase their strength.

GGBS gains strength in ratio of 30% compare to 10% and 20% GGBS after 21 days. Like this 10% and 20 % GGBS cubes increses their strength maximum at 21 Days.

- **Workability**

The workability of concrete increases with the addition of fly ash, but the maximum workability is at 30% fly ash. Replacing cement with up to 10% fly ash increases slump values, but replacing cement with more than 20% fly ash increases workability.

The Workability of GGBS cubes increases maximum at 20%. And between the 10% and 30% GGBS, 30% GGBS has the good workability.

Plastic waste to fuel or biofuel

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1,2,3,4 Students, Department of Civil Engineering, SITCOE, Yadrav, Kolhapur

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Abstract - This project is concerned with the methods of changing plastic waste to fuel known as pyrolysis which is thermal degradation of materials in an atmosphere devoid of oxygen. This is accomplished by applying tremendous heat to the plastic causing degradation into smaller hydrocarbon products which include liquid fuel, gas and char residue among other things. The liquid fuel can be upgraded further to produce various useful hydrocarbons such as diesel and gasoline, and the gases may be used as a means of recovering energy. This project aims to show how plastic waste which is usually a problem can be turned into a useful source of fuel to cut down waste and improve energy practices. This project can be described as an important strategy in addressing two key problems of global significance: management of plastic waste and sustainable energy generation. With the increase of global plastic pollution and fossil fuels waning, there is an urgency in coming up with new strategies to resolve these environmental dilemmas. Such a solution includes the process of changing plastic waste into diesel fuel which not only reduces plastic waste but also enables the harnessing of an energy source.

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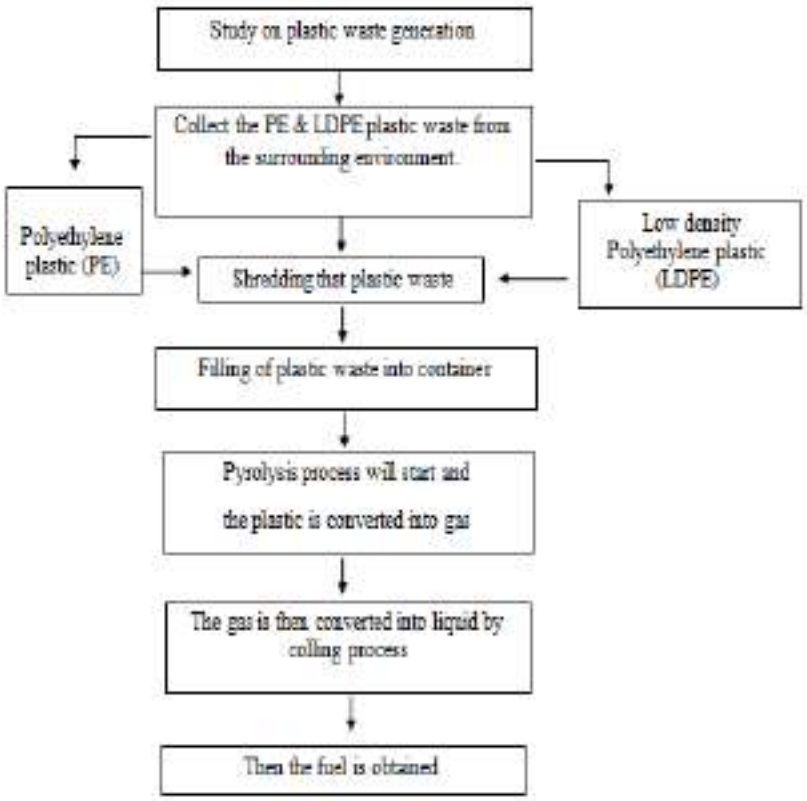
1. INTRODUCTION

In the face of rising environmental concerns, plastic waste has emerged as a significant challenge, impacting ecosystems and contributing to pollution worldwide. One innovative solution is the conversion of plastic waste into fuel, offering a dual benefit: waste reduction and energy recovery. This project explores the feasibility of transforming non-recyclable plastics into usable fuels through processes like pyrolysis, depolymerization, or gasification. By breaking down plastic polymers at high temperatures in an oxygen-free environment, hydrocarbons can be recovered and converted into liquid fuels, such as diesel or gasoline.

The project focuses on understanding the science behind these processes, evaluating the energy output, and assessing the environmental impact of the fuel produced. The approach not only helps manage plastic waste more effectively but also offers a renewable energy alternative, contributing to circular economy principles. Through this study, we aim to address the pressing issue of plastic pollution while promoting sustainable practices in fuel production. Plastic waste, particularly non-recyclable plastic, represents a significant portion of global pollution, threatening marine life, ecosystems, and human health. This project aims to tackle this issue by exploring the conversion of plastic waste into fuel. Through advanced thermochemical processes, plastic materials are transformed into synthetic fuels, creating a renewable energy source. This study will analyze the efficiency of various methods, such as pyrolysis and

depolymerization, to break down plastics and assess their potential to produce high-energy fuels. By turning waste into a resource, this approach could play a key role in addressing both environmental pollution and energy shortages. With plastic production surging globally, managing plastic waste has become an urgent environmental challenge. Most plastic waste, being non-biodegradable, ends up in landfills or oceans, causing long-lasting ecological damage. In this project, we propose an innovative solution: converting plastic waste into fuel. This process involves breaking down plastic polymers into simpler hydrocarbons through techniques such as pyrolysis or gasification. By turning waste into a valuable energy source, this approach not only mitigates the negative environmental impacts of plastic pollution but also contributes to meeting energy demands, offering a sustainable, circular solution to two global problems.

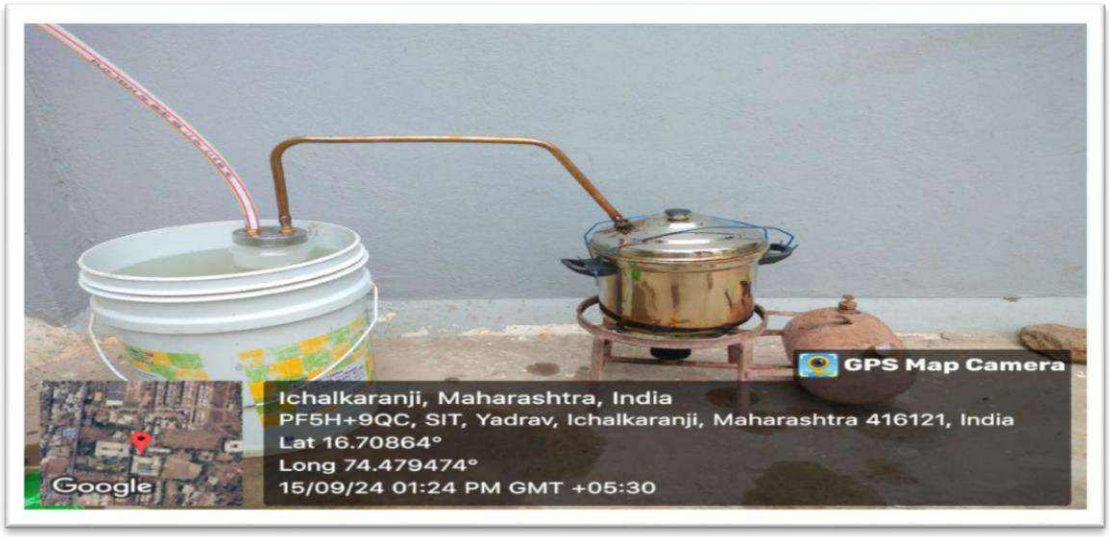
METHODOLOGY



OBJECTIVES

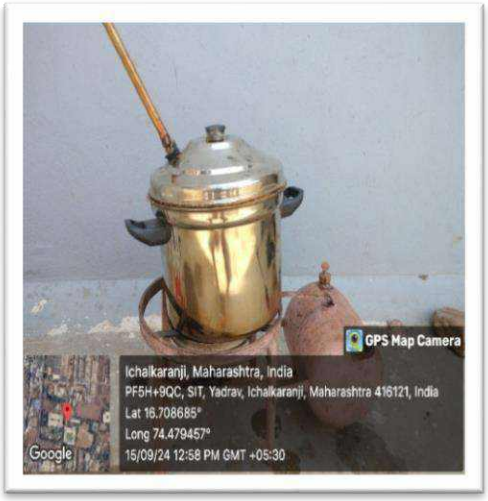
- Propose an alternative idea to reduce plastic waste.
- To prepare fuel from plastic waste.
- To determine the properties of obtained fuel.

Methodology



Photograph of Experimental model

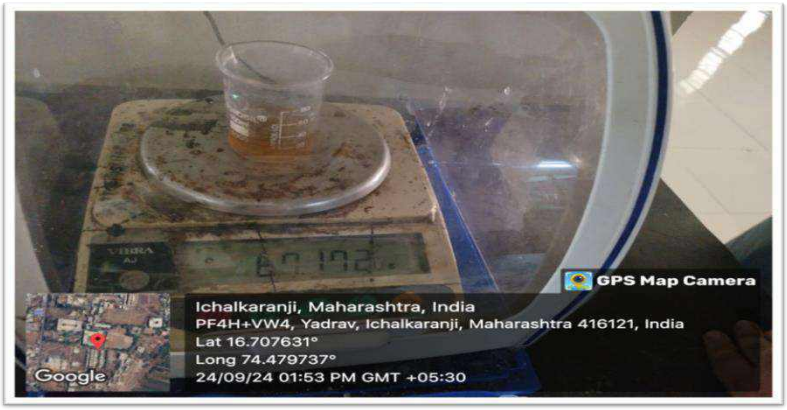
Plastic Waste Filling

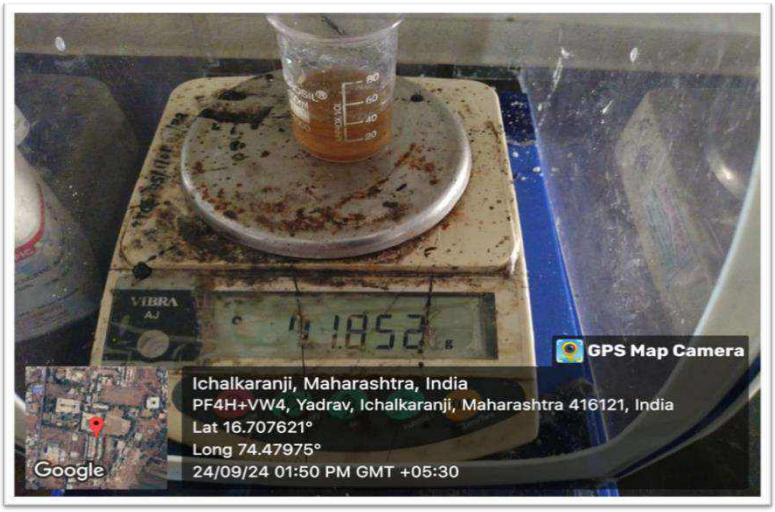


Heating Container

Fuel Collection

Sample Fuel





Result and discussion : Obtaining the fuel density test will be conducted.

SAMPLE 1

Weight of beaker = w1 = 45.16gm

Weight of beaker with fuel = w2= 58.65gm

Volume of sample = 20ml

Density = mass/volume

= w2-w1/20

= 58.65-45.16/20

= 0.67g/cc

SAMPLE 2

Weight of beaker = w1 = 45.16gm

Weight of beaker with fuel = w2= 67.12gm

Volume of sample = 30ml

Density = mass/volume

= w2-w1/30

= 67.12-45.16/30

= 0.73g/cc

SAMPLE 3

Weight of beaker = w1 = 45.16gm

Weight of beaker with fuel = w2= 71.85gm

Volume of sample = 40ml

Density = mass/volume

= w2-w1/40

= 71.85-45.16/40

= 0.66g/cc

CONCLUSIONS

The project proposes the alternative solution for the plastic waste reduction. By the pyrolysis process the fuel is obtaining. The obtained fuel will be used for burning purpose for industrial use. The remaining generated gas will be used for burning process. From approximate 1kg of plastic waste approximately 80-100ml liquid fuel is obtained. The plastic waste is reduced from environment.

Use Of Triangular Cactus Fibers And Rice Straw Fibers In Clc Bricks

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Abstract: This project explores the innovative utilization of agricultural waste, specifically rice straw fibers and triangular cactus fibers, in the production of Cellular Lightweight Concrete (CLC) bricks. The increasing demand for sustainable construction materials has prompted the investigation into alternative reinforcing fibers that can enhance the mechanical properties and durability of CLC bricks. Rice straw, a byproduct of rice cultivation, is abundant and often discarded, while triangular cactus fibers, sourced from local cactus species, offer unique structural benefits. The study involves the preparation of CLC bricks incorporating varying percentages of these fibers, followed by comprehensive testing to evaluate their compressive strength, and water absorption characteristics. Preliminary results indicate that the inclusion of rice straw and cactus fibers significantly improves the lightweight properties and eco-friendliness of CLC bricks, making them a viable option for sustainable building practices. This research not only contributes to waste management but also promotes the use of renewable resources in construction, aligning with global sustainability goals.

Introduction

CLC blocks, or Cellular Lightweight Concrete blocks, are an exciting development in the construction industry. They offer a lightweight and strong alternative to traditional concrete blocks. Now, when we incorporate Triangle Cactus Fibers and Rice Straw Fibers into CLC blocks, we take it to the next level! These biodegradable fibers have the potential to enhance the properties of CLC blocks, making them even more durable, sustainable, and environmentally friendly "Exploring the Potential of Triangle Cactus Fibers and Rice Straw Fibers in CLC Blocks." This project aims to investigate how these natural fibers can be incorporated into CLC (Cellular Lightweight Concrete) blocks to enhance their strength, durability, and sustainability. By utilizing these biodegradable fibers, we can create eco-friendly construction materials that reduce waste and promote a greener future. When it comes to construction, triangle cactus fibers can offer some unique advantages. These fibers have been explored for their potential use as reinforcement in construction materials like concrete. Due to their high tensile strength and durability, they can enhance the structural integrity of building components. Rice straw fibers have several properties that make them suitable for construction applications. Firstly, they are lightweight, which helps in reducing the overall weight of the construction materials. Additionally, rice straw fibers have good thermal insulation properties, which can contribute to energy efficiency in buildings. They also exhibit good fire resistance, making them a safer choice for construction. Furthermore, these fibers are renewable and biodegradable, aligning with sustainable construction practices. With proper processing and treatment, rice straw fibers can be incorporated into various construction materials, such as concrete or composite boards, to enhance their strength and durability

Need of the study

There are several reasons why the use of natural plant fibers is important and worth studying:
1. Sustainability: Natural plant fibers are renewable resources, which means that they can be replenished relatively quickly. This makes them a more sustainable choice compared to synthetic fibers, which are derived from non-renewable fossil fuels.
2. Environmental impact: The production of synthetic fibers can have negative environmental impacts, such as air and water pollution. In contrast, the production of natural plant fibers often has a lower environmental impact.
3. Comfort and breathability: Natural plant fibers are known for their ability to breathe, which makes them more comfortable to wear in hot or humid conditions.
4. Hypoallergenic properties: Some natural plant fibers, such as cotton and linen, have hypoallergenic properties that make them less likely to cause allergic reactions.
5.Durability: Some natural plant fibers, such as hemp and jute, are known for their strength and durability.
6. Cultural significance: In many parts of the world, natural plant fibers are a traditional and important part of the local culture and economy. The use of natural plant fibers can help to preserve and support these traditions.
7. Versatility: Natural plant fibers can be used in a wide range of products, including textiles, paper, and building materials. This versatility makes them an important resource for many industries.

Objective:

1. Use of triangular cactus fibers and rice straw fibers to increase the compressive strength.
2. Comparing the performance of CLC bricks with and without fiber.
3. To Enhancing Sustainability.
4. To promote innovation in sustainable construction practices and materials.

Methodology:

- Procedure of making of CLC bricks with rice straw and triangular cactus fibers
- Extraction of rice straw and triangular cactus fibers.
- Cutting of upper layer of rice straw and triangular cactus.
- Remove the wet core of rice straw and triangular cactus.
- keep the exctracted rice straw and triangular cactus fibers at some warm temperature to make it dry.
- Put the dry fibres in some salted water for 24 hours and dry it again.

2: Making the foam by foam agent

a.Remove the lumps if the agent in powder form and Add the foam agent into water as per the proportion 1 :30. And stir it well.
b.Fill the container with the agent
c.Start the compressor and then we will get the foam.

3**: Making the bricks**.

a.Weigh the cement , fly ash , fibers and foam as per the proportion.
b.Make the mesh of weighted fiber.
c.Mix the all ingredient in a pan in well manner. Remove the lumps.
d.Fill the mixture in 3 layers.
e.After filling first layer lay the mesh of a rice straw fiber and triangular cactus fiber in zig zag manner and repeat this process for 2nd and 3rd layer
f.After filling give it the finishing touch and cure the bricks for 7 , 14 and 28 days

Observations:

Compressive strength testing

SR.NO	PROPORTION	WEIGHT(kg)	28 DAYS COMPRESSIVE STRENGTH (N/MM^2)
1.	Standard CLC Brick	4.4	3.54
2.	20%- FLY ASH 80%-CEMENT	4.5	3.1
3.	30%- FLY ASH 70%-CEMENT	4.33	2.96
4.	40%- FLY ASH 60%-CEMENT	4.16	2.68

Bricks with fiber reinforcement

Description Of CLC Bricks	Proportion	Triangular Cactus Fibers		Rice Straw Fibers	
		Weight (KG)	Compressive Strength (N/MM2)	Weight (KG)	Compressive Strength (N/MM2)
20% fibers by volume of bricks	20%- FLY ASH 80%-CEMENT	4.5	3.84	3.1	2.80
	30%- FLY ASH 70%-CEMENT	4.26	3.04	3	2.10
	40%- FLY ASH 60%-CEMENT	4.085	2.87	2.8	1.80
30% fibers by volume of bricks	20%- FLY ASH 80%-CEMENT	4.524	3.024	2.9	1.33
	30%- FLY ASH 70%-CEMENT	4.294	2.96	2.83	1.31
	40%- FLY ASH 40%-CEMENT	4.152	2.68	2.72	1.26
40% fibers by volume of bricks	20%- FLY ASH 80%-CEMENT	4.252	2.86	2.81	1.23
	30%- FLY ASH 70%-CEMENT	4.191	2.72	2.73	1.16
	40%- FLY ASH 80%-CEMENT	4.251	2.66	2.67	1.01

Test on Brick

Water absorption test

20% FLY ASH 80% CEMENT	**30% FLY ASH 70% CEMENT**	**40% FLY ASH 60% CEMENT**
Percentage of absorbed water	Percentage of absorbed water	Percentage of absorbed water
5.02	5.48	5.58

Results and discussion:-

As we know the red clay bricks are commonly used in the construction work of any structure. But the CLC bricks are not used as load carrying member. But after adding triangular cactus fibers and rice straw fibers we can get the result better than the red clay bricks in all aspects like weight, water absorption, compressive strength etc.

Results

1) Weight of CLC bricks with 40 % triangular cactus fibers and rice straw fibers is less than the weight of CLC brick without fibers.
2) Compressive strength of CLC bricks with 20 % triangular cactus fibers and rice straw fibers is more than the CLC brick without triangular cactus fibers and rice straw fibers.
3) CLC bricks with triangular cactus fibers and rice straw fibers absorb more water than the CLC brick without sisal fiber.
4) CLC bricks with 20 % triangular cactus fibers and rice straw fibers doesn't break when we drop it from 4 feet.

Conclusions

After all the tests we can conclude that the CLC bricks with 20% fiber of triangular cactus fibers are more better than the CLC bricks without fiber and in economical aspect also.
CLC bricks with 20% fiber can be exchanged with standard CLC bricks.

Seepage Analysis Using Sensor In Earthen Dam.

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1,2,3,4 Students, Department of Civil Engineering, SITCOE, Yadrav, Kolhapur

Abstract - Seepage is the movement of water or any fluid through the soil or the ground, often causing critical problems in geology. Seepage synonyms include leakage, but there are differences in the flow rate and mechanism. Leak sensors or detectors can help identify seepage and leaks, providing early warnings to prevent potential damage or accidents

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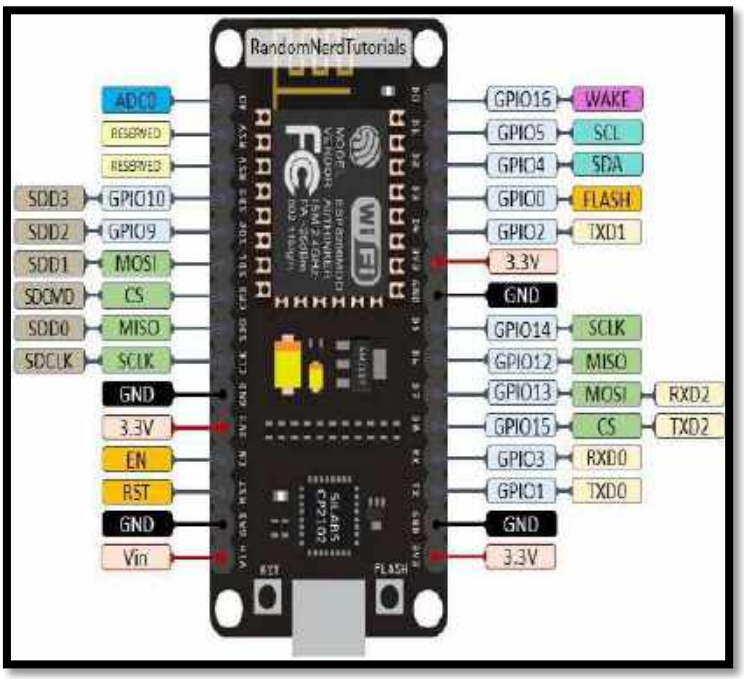
INTRODUCTION

Seepage is the movement of water in soils or the ground. The flow of water through the soil or ground is called seepage. But seepage meaning does not only limit itself to water only but other fluids as well. Thus, seepage meaning is the flow of water or any fluid through the soil or the ground. Seepage is often a critical problem in geology. A common example of such a problem is the flow of water or fluids through the building foundations. This flow of water or other fluids occurs through the pores or interstices. It is a common phenomenon around hydraulic structures in buildings or water bodies. Seepage of Groundwater Commonly speaking seepage synonyms is leakage. But there is a difference between the two. Leakage is the flow of water not through the interstitial or very minute spaces in-between material molecules but through the cracks of damaged materials carrying water or any other fluids. Also, the flow of water through leakage is generally faster than the seepage.

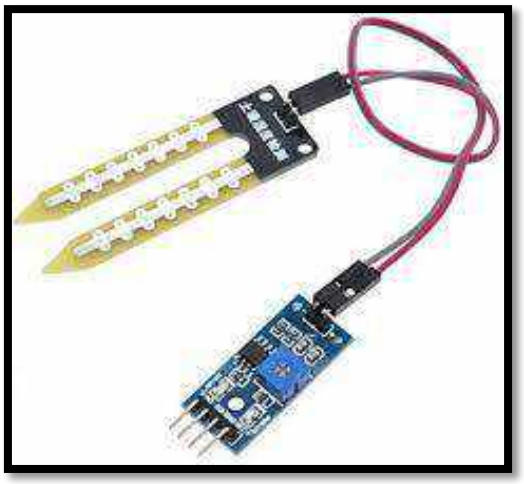
Material: Soil

Node MCU 8266: NodeMCU is an open-source IoT (Internet of Things) platform based on the ESP8266 Wi-Fi module. It can be used to control various electronic devices and make them communicate with each other over a network.



Soil Moisture Sensor:

Soil moisture sensors (SMSs) measure soil moisture at the root zone and regulate the existing conventional irrigation timer, resulting in considerable water savings when installed and used properly. A customized soil water content threshold is set, allowing for dryer or wetter soil condition.



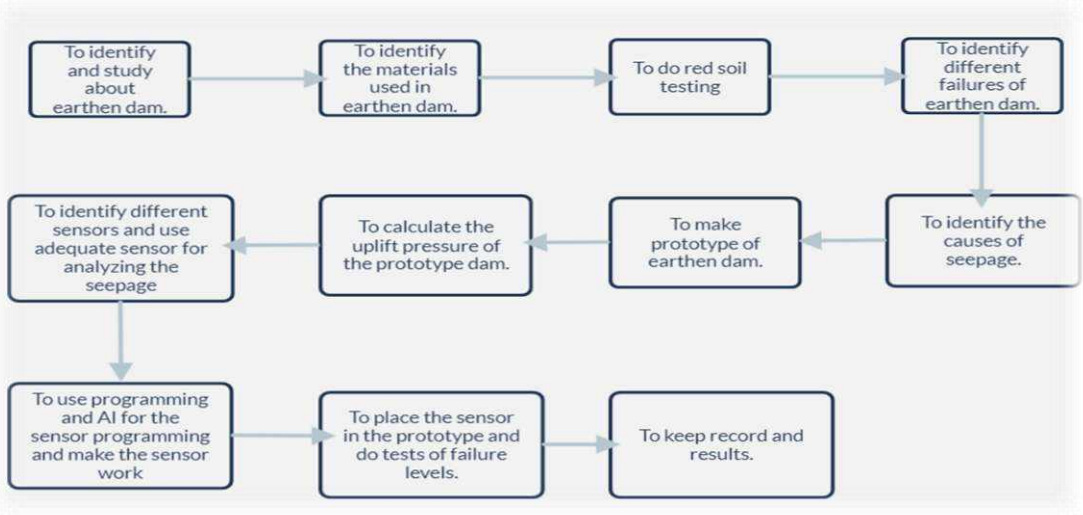
OBJECTIVES

1. To identify the properties of soil.

2. To identify the failure when the soil gets saturated.

3. To identify the seepage analysis using sensor.

Methodology



CONCLUSION:

In conclusion, the use of sensors for seepage analysis in earthen dams has proven to be an effective and reliable method for monitoring and managing the health and stability of these critical structures. The integration of sensors—such as piezometers, geophones, and water level sensors—allows for real-time monitoring of water movement within the dam, providing valuable insights into seepage patterns and potential risks.

1. Enhanced Detection of Seepage Locations: Sensors allow for precise identification of areas where seepage occurs, even in remote or difficult-to-access parts of the dam. This early detection is critical for timely intervention and maintenance.

2. Continuous Monitoring: Unlike traditional manual inspection methods, sensors provide continuous data, enabling the detection of gradual changes in seepage behavior that might go unnoticed in periodic visual inspections.

3. Improved Dam Safety: By detecting abnormal seepage rates, unusual pressure, or water flow at critical locations, sensors help identify potential structural issues before they escalate into failures, thereby enhancing the safety of the dam.

4. Data-Driven Decision Making: The data collected by sensors can be used for detailed analysis and predictive modelling, allowing engineers to better understand seepage dynamics, optimize maintenance schedules, and make informed decisions about remedial actions.

5. Cost-Effectiveness: While the initial investment in sensor technology may be substantial, the long-term benefits—such as reducing the risk of dam failure, extending the lifespan of the dam, and minimizing repair costs—make it a cost-effective solution.

Dam operation based on water level using Sensor

Shrenik Lale[1], Aditya Chougule [2], Akhil Chougule[3], Sarthak Havale [4]

1,2,3,4 Students, Department of Civil Engineering, SITCOE, Yadrav, Kolhapur

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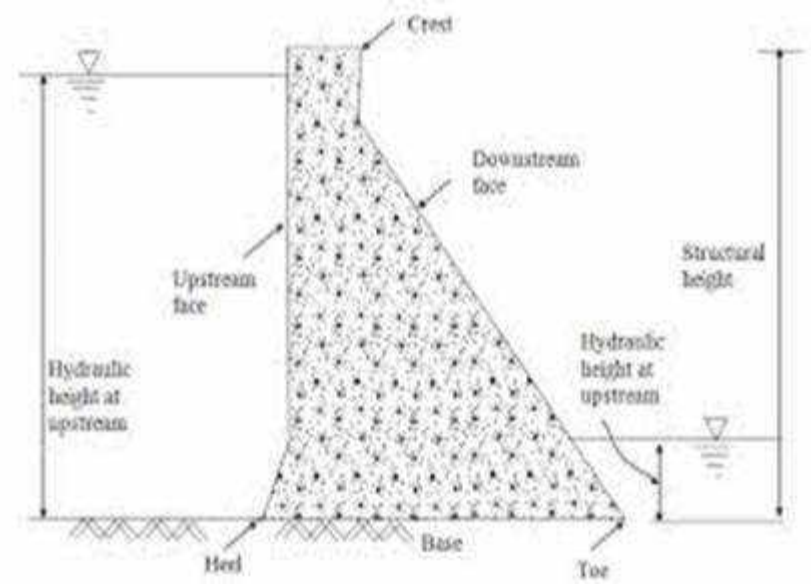
Abstract - The management of water resources in dams is critical to ensure optimal utilization while mitigating risks such as flooding and drought. This project focuses on designing and implementing a system that uses sensors to monitor and control dam operations based on real-time water level data. The system employs advanced water level sensors to continuously measure the reservoir's height, feeding the data to a control unit. The control unit, equipped with pre-set threshold values and decision-making algorithms, automates the operation of dam gates to regulate water flow. By leveraging sensor technology and automation, this system enhances the accuracy and efficiency of dam operations, reducing reliance on manual monitoring and minimizing response time during critical events. The project aims to demonstrate improved water management practices, ensuring better safety, resource allocation, and environmental balance. The results highlight the potential of integrating IoT (Internet of Things) and sensor technologies in modern dam management systems.

INTRODUCTION

A gravity dam is a dam constructed from concrete or stone masonry and designed to hold back water by using only the weight of the material and its resistance against the foundation. They are designed so that each section of the dam is stable and independent of any other dam section. Gravity dams have a particular function. The weight of the gate causes it to fall. When the gate falls, it opens the gap between the upstream part and the downstream part. Once the gap is opened, water can flow freely between the upstream part and downstream part. The forces acting on an overflow dam or spillway section are complicated by steady state hydrodynamic effects. Hydrodynamic forces result from water changing speed and direction as it flows over a spillway. It necessitates developing an automatic dam water level monitor and controller system.



OBJECTIVES

- To construct the model of dam.
- To study the working of gate based on sensor technology.
- To collect data based on model.
- Automated dam gate operation.

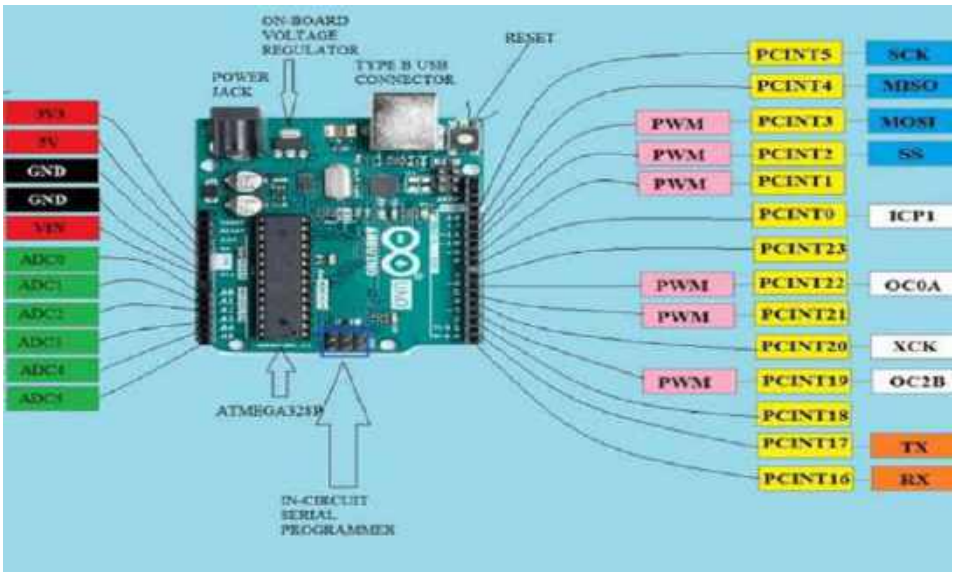
Material

1. Working Model

2. Software Requirements: Arduino Ide And Programming Language: C/C++

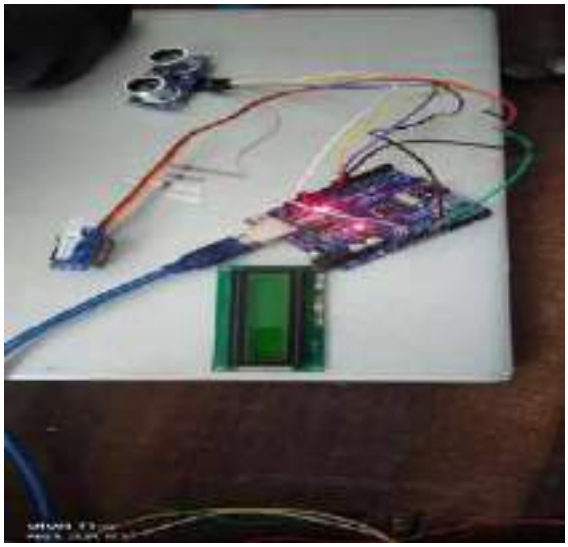
3. Hardware Requirements:

a.Microcontroller board (e.g., Arduino Uno)



Micro Controller

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.



Micro Controller

b.Ultrasonic sensor

Ultrasonic ranging module HC-SR04 includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

- Using IO trigger for at least 10us high level signal
- The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
- If the signal back, through high level, time of high output IO duration is the time from sending ultrasonic to returning.
- Test distance = (high level time × velocity of sound (340m/s)/2

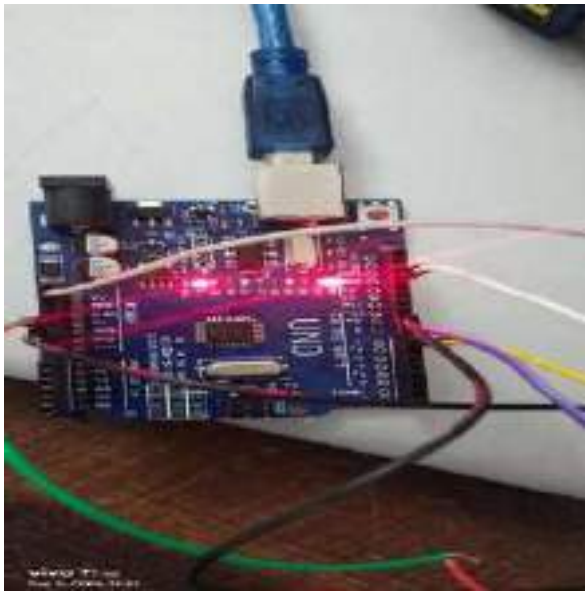
Ultrasonic sensor

The ultrasonic sensor is used to measure the water level.

As the water level reaches the first sensor message is displaying in LCD for the admin. When water level reaches the second sensor, dam gate is opened half and an alert message is displayed in LCD to admin.

As the water level reaches third sensor, beyond a critical level, the GSM will inform the residents near the dam that the shutter will open soon.

The motor interfaced with the Arduino will be initiated and opens the shutter after providing a final warning message.



Arduino UNO

Sensor Working

As the water level reduces, the motor will close the shutters and gets back to normal stage.

Power supply: It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

METHODOLOGY

Methodology provides a basic framework for automating dam operation based on water level using sensors

Step 1: Sensor Calibration

1. Install ultrasonic sensor above water surface.

2. Calibrate sensor to measure water level accurately.

Step 2: Water Level Measurement

1. Sensor sends ultrasonic waves towards water surface.

2. Measures time-of-flight to calculate water level.

Step 3: Data Processing

1. Microcontroller reads sensor data.

2. Compares water level with predefined thresholds.

Step 4: Monitoring and Alert

1.Display water level on LCD (optional).

Step 5: Power Supply:

1.5V/12V DC power supply.

Used Code for Sensor

```
#include <Servo.h>
#define trigPin 12
#define echoPin 11
#define servoPin 9
Servo servo;
void setup() {
Serial.begin(9600);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
servo.attach(servoPin);
}
void loop() {
long duration;
float distance;
// Clear the trigger pin condition
```

```
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
// Send a 10 microsecond pulse to trigger the measurement
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
// Read the echo pin
duration = pulseIn(echoPin, HIGH);
// Calculate distance in centimeters
distance = (duration / 2.0) * 0.0344;  // Use 0.0344 cm/µs for speed of sound in air
// Control the servo based on distance
if (distance < 10) {
Serial.println("The distance is less than 10 cm");
 servo.write(90);  // Move servo to 90 degrees
delay(1500);       // Wait for 1.5 seconds
} else {
servo.write(0);   // Move servo to 0 degrees
}
// Print distance information
if (distance > 60 || distance <= 0) {
Serial.println("The distance is more than 60 cm or invalid");
} else {
```

```
Serial.print("Distance: ");

Serial.print(distance);

Serial.println(" cm");

}

delay(500);  // Wait for 500 milliseconds before the next measurement

}
```

RESULTS-

- Automated dam operation.
- Real-time monitoring.
- Accurate water level forecasting.
- Data-driven decision-making.
- Reduced risk of flooding.

CONCLUSIONS

This project demonstrated that a sensor-based system can effectively monitor water levels and automate dam operations, improving safety and efficiency. The system ensures timely responses to changing water levels, reducing flood risks and optimizing resource management. By minimizing human intervention, it enhances reliability and paves the way for smarter, more sustainable dam management.

Design and construction of a filtration system for water treatment using natural materials

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Abstract - The design and construction of a filtration system for water treatment using natural materials aim to provide an efficient, low-cost, and eco-friendly solution to water purification. This project explores the use of readily available natural materials such as sand, gravel, activated charcoal, and zeolite, Activated Alumina in a multi-layer filtration system. The objective is to remove contaminants, sediments, and impurities from water, improving its quality for domestic and industrial use. The system's design emphasizes simplicity, affordability, and sustainability, making it suitable for rural and underserved communities with limited access to clean water. The filtration process incorporates layers of different natural materials, each targeting specific impurities. Gravel and sand remove larger particles, while activated charcoal and zeolite absorb chemical impurities and improve the water's odor and taste. Laboratory tests will be conducted to evaluate the system's efficiency in removing common pollutants such as heavy metals, pathogens, and organic compounds. The project's outcome could offer a scalable model for communities seeking sustainable water treatment solutions. -

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INTRODUCTION

Water is a very important natural resource, and only 3% of the Earth's water is freshwater, which comes mostly from rivers, glaciers, and underground sources. In India, most of the groundwater is filled up during the rainy season, with about 342.43 km³ coming from rain and an extra 89.46 km³ from canal water (Kumar et al.). Even with this, many Indian cities have big problems with not having enough clean water, made worse by old infrastructure and dirty water being let out without being cleaned, which makes the water more dirty with bacteria and other bad things. To make sure we have safe drinking water and water for farming, we need good ways to clean water. Different methods, like using physical, chemical, and biological ways, are used to remove bad stuff from water, and using things that stick to the bad stuff, called adsorption, is becoming a very good and cheap way to do this. Common materials used for this are things like activated carbon, chitosan, zeolite, and clay, which can come from both plant and industrial waste and are being used more and more.

Water is a very important natural resource on Earth. Out of all the water on Earth, 97% is salty, and the rest is fresh water found in rivers, streams, and glaciers. Water that is underground, like in aquifers, is called groundwater. This groundwater gets replenished, or filled up again, mainly from rain, especially during the monsoon season in India. Irrigation systems, like canals, also help to recharge groundwater. In India, rain can naturally recharge about 342.43 cubic kilometers of groundwater each year, which is about 8.56% of the total annual rainfall. The canal irrigation system can add another 89.46 cubic kilometers to this recharge. In many Indian cities, water is only available for a few hours each day, and its quality is often not good. Problems with water supply also happen because of low pressure, irregular supply, and not enough water.

The water should be safe and free from harmful microorganisms, and just having a steady supply isn't enough. Another issue is water waste from leaks and unauthorized connections. "From 1995 to 2006, water quality tests showed that organic and bacterial contamination in water sources remains a big problem. This is mostly because cities are releasing untreated household wastewater into the water. Most city governments can't handle the growing amount of untreated sewage going into water sources. Also, the water bodies don't have enough clean water to dilute the pollution.

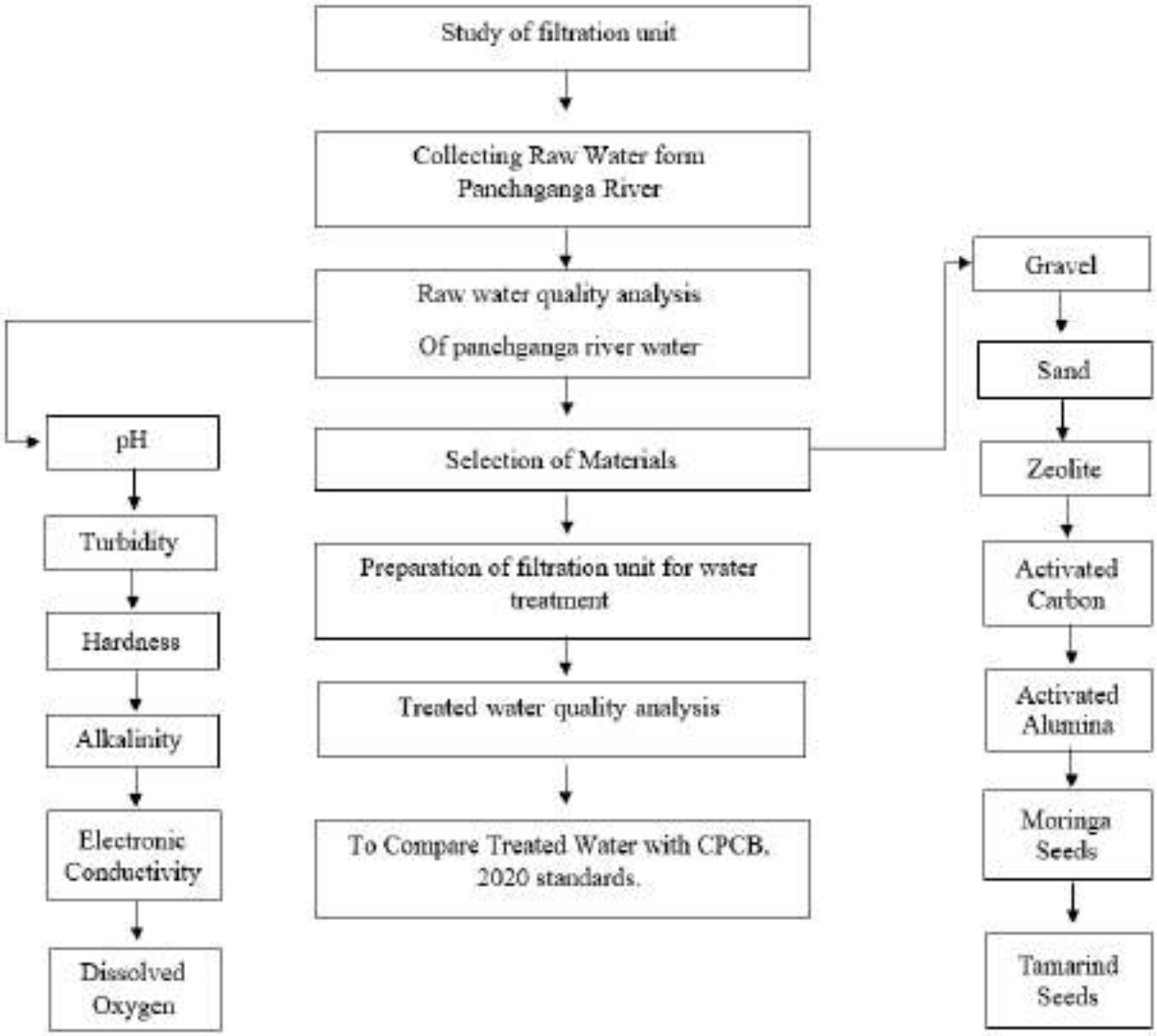
As a result, the need for oxygen and bacterial contamination in the water is growing, which leads to waterborne illnesses." A water filter cleans water by using a fine barrier, a chemical reaction, or a biological process to remove harmful substances.

Filters clean water to various degrees for uses like supplying water for farming, making drinking water safe, maintaining public and private fish tanks, and ensuring the safety of ponds and swimming pools. Filters use methods like sieving, attracting and holding particles,

swapping ions, transferring biological substances, and more to take out unwanted things from water. Unlike a sieve or screen, a filter can remove very tiny particles that are smaller than the holes it lets water pass through. Wastewater filtration is usually part of the last step in cleaning water, after it has gone through the first and second cleaning stages and just before it gets disinfected. As water moves through the filter, leftover particles and bacteria get caught in the filter and are removed from the cleaned water. This can happen because of physical blockages, biological actions, particles sticking to the filter, particles being absorbed, or a mix

of these things. Wastewater filtration is often the last step in removing solid particles from water. Many researchers are focusing on water pollution and using different ways to clean polluted water, like chemical precipitation, biological membrane methods, and electrochemical methods. Among these, the adsorption method, which uses various materials to clean water, is popular because it works well, costs less, and causes less harm to the environment. This method uses materials like activated carbon, chitosan, zeolite, and clay minerals from plants and industrial waste as "sponges" to clean the water.

METHODOLOGY



Objectives

- Assessment of raw water quality of PanchaGanga river water sample
- Design of filtration unit for panchaganga river water sample treatment
- Comparative analysis of treated water sample with CPCB 2020 standards.

Experimental setup

Filter media bed added to in on the model

Filter media bed added to in on the model

Addition of Filter media and natural material

Results

pH of water

Table shows pH before and after filtration

Sample	Before	After
Sample 1	7.79	7.65
Sample 2	7.80	7.68
Sample 3	7.78	7.63
Avg	7.79	7.65

pH value can effect on aquatic life and also can change water chemistry.

Conductivity

Table shows Conductivity before and after filtration

Sample	Before	After
Sample 1	0.155	0.118
Sample 2	0.156	0.121
Sample 3	0.154	0.117
Avg	0.155 ms	0.119 ms

Portable water generally has low conductivity exhibiting the fact that low concentration of TDS polluted and contaminated water generally has more conductivity indicating higher concentration dissolved salts.

Turbidity

Table shows turbidity before and after filtration

Sample	Before	After
Sample 1	50.8	24.6
Sample 2	45.8	24.8
Sample 3	50.5	25.2
Avg	49.03 NTU	24.86NTU

Alkalinity Test

Table shows Alkalinity before and after filtration

Sample	Before	After
Sample 1	15.3	7.9
Sample 2	15.8	8.1
Sample 3	16.1	7.8
Avg	15.7 mg/l	7.9 mg/l

Higher alkinity reflects present of more carbonates and bicarbonates and can change the chemistry of water.

Table shows Dissolved oxygen before and after filtration

Sample	Before	After
Sample 1	5	5.2
Sample 2	4.6	5.7
Sample 3	4.1	5.1
Avg	4.56 mg/l	5.33 mg/l

Increase the DO is the indication of purity of water however to much of DO is also not desirable test of water mainly depends on the oxygen percentage in water. DO is the main cause of entire aquatic ecosystem sustainability and survival.

Table shows Hardness before and after filtration

	Before	After
Total Hardness	229 mg/l	90 mg/l
Permanent Hardness	138 mg/l	62 mg/l
Temporary (T-P)	91 mg/l	28 mg/l

- Too much of hard water affects industrial water and test of water although people consuming hard water it can affect the health in the long run.

CPCB STANDARDS

These standards aim to ensure that water quality is maintained at levels supporting the health of aquatic ecosystems and human uses. For specific regulatory purposes or local standards, it is advisable to check the latest CPCB guidelines or relevant local regulations.

CPCB standards for river water 2020

Parameter	Standard Value
pH	6.5 - 8.5
Turbidity	≤ 5 NTU
Dissolved Oxygen (DO)	5 mg/L
Hardness	less than 1000 µS/cm
Alkalinity	Generally should be less than 200 mg/L (as $CaCO_3$).

CONCLUSIONS

The study revealed change of pH value from alkaline to portable range indicating affective function of the filter bed electrical conductivity also reduced of from 0.155 ms/cm for raw water 0.119 ms/cm. These clearly indicates improvement in the quality of filtered water compare to raw water further record and values of turbidity reflected appreciable decrease in the concentration total 15.7 mg / liter for raw water 7.9 mg / litre for filter water the study also record it improvement do concentration after filtration as per to Raw water.

With above observations and recorded values it is clearly that the provided filter it is works efficiency in improve it the water quality the study revealed that the filtered provided can work under any efficiency range up to 45 to 50% this is reflected in the above recorded value