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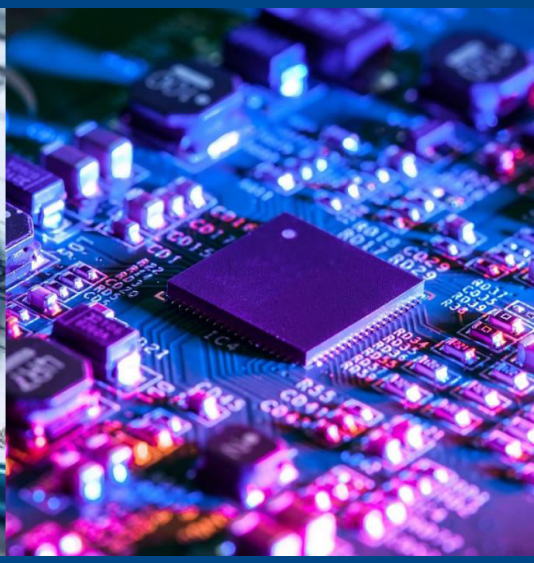

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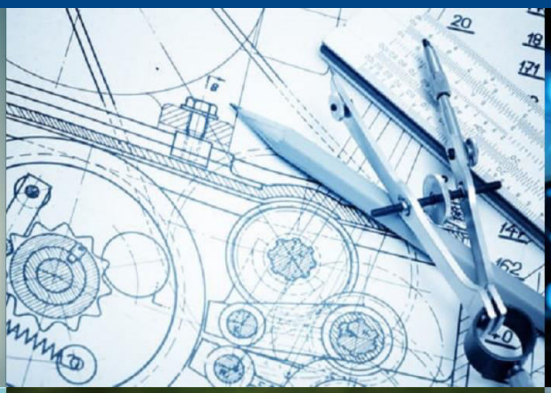

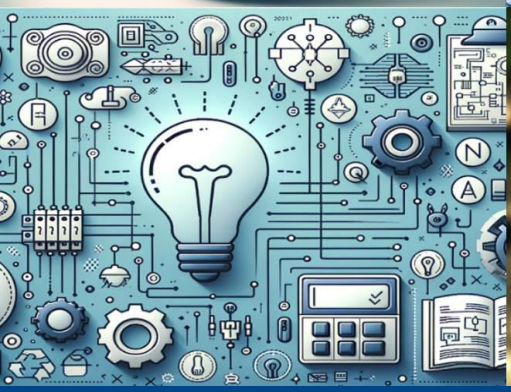

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To Check the Strength of Concrete using Plastic Materials

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ABSTRACT: Plastic waste poses significant environmental challenges. This study. explores the potential use of plastic waste as a sustainable aggregate in construction materials, reducing waste disposal issues while promoting eco-friendly building practices. The objective of this research is to investigate the effectiveness of using waste plastic as a aggregate replacement in concrete mixtures. The investigation focuses on the flexural strength, compression strength, split tension test of concrete specimens containing varying percentages of recycled plastic material.

KEYWORDS: Compression test, split tension test, Flexural Strength.

I. INTRODUCTION

Concrete, a fundamental construction material, requires rigorous testing to ensure its strength and durability. Traditional methods, such as compressive strength tests, have been widely used, but they are often time-consuming, expensive, and destructive. In recent decades, researchers have explored innovative approaches to assess concrete strength, including the use of plastic materials. In the past, several studies have investigated the potential of plastic materials to evaluate concrete strength. For instance, in the 1990s, researchers used plastic fibers to monitor concrete deformation and strain. Later, in the 2000s, plastic-based sensors were developed to measure concrete's electrical resistivity and correlate it with strength.

Concrete, a vital construction material, requires accurate and efficient strength assessment to ensure structural integrity and safety. Traditional testing methods, such as compressive strength tests, are often time-consuming, expensive, and destructive. In recent years, the construction industry has witnessed a paradigm shift towards innovative, non-destructive, and sustainable testing methods. Currently, researchers and engineers are exploring the potential of plastic materials to evaluate concrete strength. Advanced plastic-based sensors and testing systems have emerged, offering promising results. These innovative methods leverage the unique properties of plastic materials, such as their durability, flexibility, and sensitivity to environmental changes.

This study proposes to investigate the feasibility of using Polyethylene Terephthalate (PET) plastic to evaluate concrete strength. The proposed method involves embedding PET plastic sensors within concrete specimens and monitoring their deformation and strain under load. The use of PET plastic offers several advantages, including sustainability, cost-effectiveness, and non-destructive testing. This study aims to explore the potential of PET plastic sensors to accurately assess concrete strength, with the ultimate goal of developing a novel, sustainable, and cost-effective testing method for the construction industry.

II. LITERATURE REVIEW

Paper NO.1

A study titled "Characteristics Study of Concrete Using Plastic Waste" by D. Remadevi, P. Vinodh Kumar, and R. Vinodh Kumar investigated the effects of incorporating plastic waste on the properties of concrete. The researchers used a mix design of M25, consisting of 185.58 liters of water, 412.4 kg of cement, 446.00 kg of fine aggregate, and 1320.94 kg of coarse aggregate, with varying percentages of plastic waste (10%, 20%, and 30%). The results showed

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that the compressive strength of concrete decreased with the addition of plastic pieces, with a 20% reduction in strength observed after 28 days of curing when 10% plastic was added. However, the splitting tensile strength test revealed that adding 10% plastic improved the tensile strength, while further additions beyond 10% resulted in decreased concrete strength.

Paper NO.2

A study titled "Use of Waste Plastic as Fine Aggregate Substitute in Concrete" by Pushpa Lumine, Pallavi G.A, Bhavya CH, Vanishree S, and Supriya CB explored the feasibility of using high-density polyethylene waste plastic as a substitute for fine aggregates in concrete. The researchers used OPC 59-grade cement, 20mm coarse aggregate, and varying percentages of plastic waste (0%, 5%, 10%, and 15%). The results showed that the compressive strength of concrete decreased with increasing plastic waste percentages, while the water absorption test revealed that concrete with plastic waste performed better, with water absorption decreasing from 28.08% to 9.569% as plastic waste increased. The study concluded that plastic waste concrete is suitable for low-load applications and recommended future research to optimize mix ratios and improve compressive strength by grinding waste plastic into a fine powder.

Paper NO.3

A study title "Study the effect of plastic waste on strength of concrete "by Gopal Swarup Sangal's study investigates the effect of plastic waste on the strength of concrete. The research aims to explore the potential of using plastic waste as a replacement for fine aggregates in concrete mixtures. The results show that incorporating plastic waste can have varying effects on concrete strength, depending on the type of plastic used. While some plastics, like PVC, increase both compressive and tensile strength, others, like plastic bags and seats, decrease compressive strength but increase tensile strength. The study suggests that replacing fine aggregates with plastic waste up to 10% can result in only a 15% loss of compressive strength, while improving tensile strength.

Paper NO. 4

A study title " Study on Recycled waste plastic concrete " by P.Manikandan. The use of recycled waste plastic in concrete has gained significant attention in recent years due to its potential to address environmental and ecological problems. A study conducted by P. Manikandan and Dr. S. Senthamil Kumar explored the feasibility of using plastic waste as a replacement for coarse aggregates in concrete. The researchers investigated the mechanical properties of recycled waste plastic concrete, including compressive strength, split tensile strength, and modulus of elasticity. The study revealed that the use of plastic waste in concrete can help reduce the consumption of coarse aggregates, thereby contributing to sustainable construction practices. The results also showed that the compressive strength, split tensile strength, and modulus of elasticity of concrete were affected by the addition of plastic waste. The study highlights the potential of using recycled waste plastic in concrete and its significance in reducing plastic waste and promoting sustainable construction practices.

Paper NO. 5

A study title- "Producing sustainable concrete with plastic waste".The increasing production of plastic waste has become a significant environmental concern, with millions of tons of plastic waste generated annually. To address this issue, researchers have explored the use of recycled plastic waste in concrete production. This review paper discusses the potential benefits of using plastic waste in concrete, including enhanced sound and thermal insulation, reduced weight, and lower manufacturing costs. The study suggests that replacing up to 75% of aggregate with plastic waste can significantly improve the insulation properties of concrete, making it suitable for non-structural building components. Furthermore, the use of plastic waste in concrete can help reduce the environmental burden of plastic waste, promote sustainability, and provide a cost-effective solution for the construction industry.

Summary of Literature

Researchers have investigated the use of plastic waste in concrete production, exploring its effects on concrete properties and environmental sustainability. The studies found that incorporating plastic waste into concrete can improve insulation properties, reduce production costs, and promote sustainability. However, the addition of plastic waste can also affect concrete's compressive strength, tensile strength, and durability.

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The studies used various types of plastic waste, including high-density polyethylene and polyvinyl chloride, and replaced different percentages of fine and coarse aggregates with plastic waste. The results showed that the compressive strength of concrete decreased with increasing plastic waste percentages, but the tensile strength improved with the addition of certain types of plastic waste.

The studies concluded that plastic waste concrete is suitable for low-load applications, such as non-structural building components, and can provide a cost-effective solution for the construction industry. Furthermore, the use of plastic waste in concrete can help reduce the environmental burden of plastic waste, promote sustainability, and provide a viable solution for waste management.

Overall, the studies demonstrate the potential of using plastic waste in concrete production, offering a sustainable and cost-effective solution for the construction industry while promoting environmental sustainability.

III. AIM AND OBJECTIVES

- **Aim** –

1. To improve the compression strength of concrete.
2. To improve the Flexural Strength of concrete.

- **Objectives** –

1. By adding optimum percentage of waste plastic in concrete.
2. By adding optimum percentage of plastic in beam.

IV. EXPECTED RESULTS

The expected results of this study demonstrate the potential benefits of using PET plastic waste in concrete, including improved sustainability, reduced environmental impact, enhanced thermal insulation, increased durability, and cost savings. The optimum percentage of PET plastic waste replacement is expected to be around 10-15%, which can provide a balance between the benefits of using plastic waste and the potential drawbacks on concrete properties. Furthermore, the use of PET plastic waste in concrete can help to reduce the energy consumption and greenhouse gas emissions associated with traditional concrete production, making it a more environmentally friendly option. However, further research is needed to optimize the use of PET plastic waste in concrete and to address the challenges associated with its implementation, such as ensuring the quality and consistency of the plastic waste, and developing standards and guidelines for its use in concrete. Future studies should investigate the long-term durability and performance of PET plastic waste concrete, as well as its scalability and feasibility for large-scale construction projects. Ultimately, the use of PET plastic waste in concrete has the potential to transform the construction industry, reducing waste and promoting sustainability.

V. CONCLUSION

The use of polyethylene terephthalate (PET) plastic waste in concrete has emerged as a promising solution for sustainable construction practices. By incorporating PET plastic waste into concrete, researchers aim to reduce the staggering amount of plastic waste sent to landfills each year, conserve natural resources, and mitigate the environmental impacts associated with traditional concrete production.

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