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An Experimental Analysis on Partially Replaced Concrete with Magnetic Sand

Aasif B[1], Ranjith S[2], Malathi V[3], Dhachinamoorthy M[4] & Vijayalakshmi S[5]

[1-4]*Graduate Students,* [5]*Assistant Professor,*
[1-5]*Department of Civil Engineering, Podhigai College of Engineering and Technology, Tirupattur, Tamilnadu.*

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ABSTRACT

Concrete is one of the most widely used building materials throughout the world. Concrete is used in large amounts because it is an extremely good building material. In many places of the world the temperature is rising day by day. These days due to constant sand mining the natural sand is depleting at an alarming rate. In this case, fine aggregate is partially replaced by magnetic sand. In this present study, an attempt has been made to study the mechanical properties of M_{25} grade concrete with a different percentage at a range of 10%, 15% and 20% as partially replaced with magnetic sand to the total weight of fine aggregate.

It has been experimented that the required strengths are achieved the optimum percentage of magnetic sand by conducting compressive strength and flexural strength of concrete. Use of magnetic sand in concrete, will enhance shrinkage and crack resistance and reduce the environmental impact and also reduce the cost. The compression and flexural strength of concrete increases with various percentage replacements of magnetic sand. The main aim of this study is to make economical and eco-friendly concrete.

Introduction

Ordinary Portland cement (OPC) is the most widely used manufactured material for construction purpose. Upcoming modern trends, the future of concrete looks higher because for most purpose it provides more convenient Engineering properties at low cost combined with energy savings and ecological benefits.

It is desirable that engineers know about concrete that about building and construction material. Due to the growing agriculture, Urban/rural and industrial expectation, water level need in very need in every Continent are filling, by this the drinking water are becoming scary.

So, it is suggested that with water with practical large-scale solution which are not currently efficient. The most widely used construction material is concrete, commonly made by mixing ordinary Portland cement with sand, aggregate and water

Objective

1. To study the strength properties with increasing the percentage values of magnetic sand.

2. To find out the characteristics properties of concrete by conducting various tests as per IS codes.

3. To reduce the cost of construction.

Scope of the Paper

1. To economize the cost of construction.

2. To study of compressive and flexural strength development of concrete by using magnetic sand.

3. To minimize the utilization of fine aggregate.

Methodology

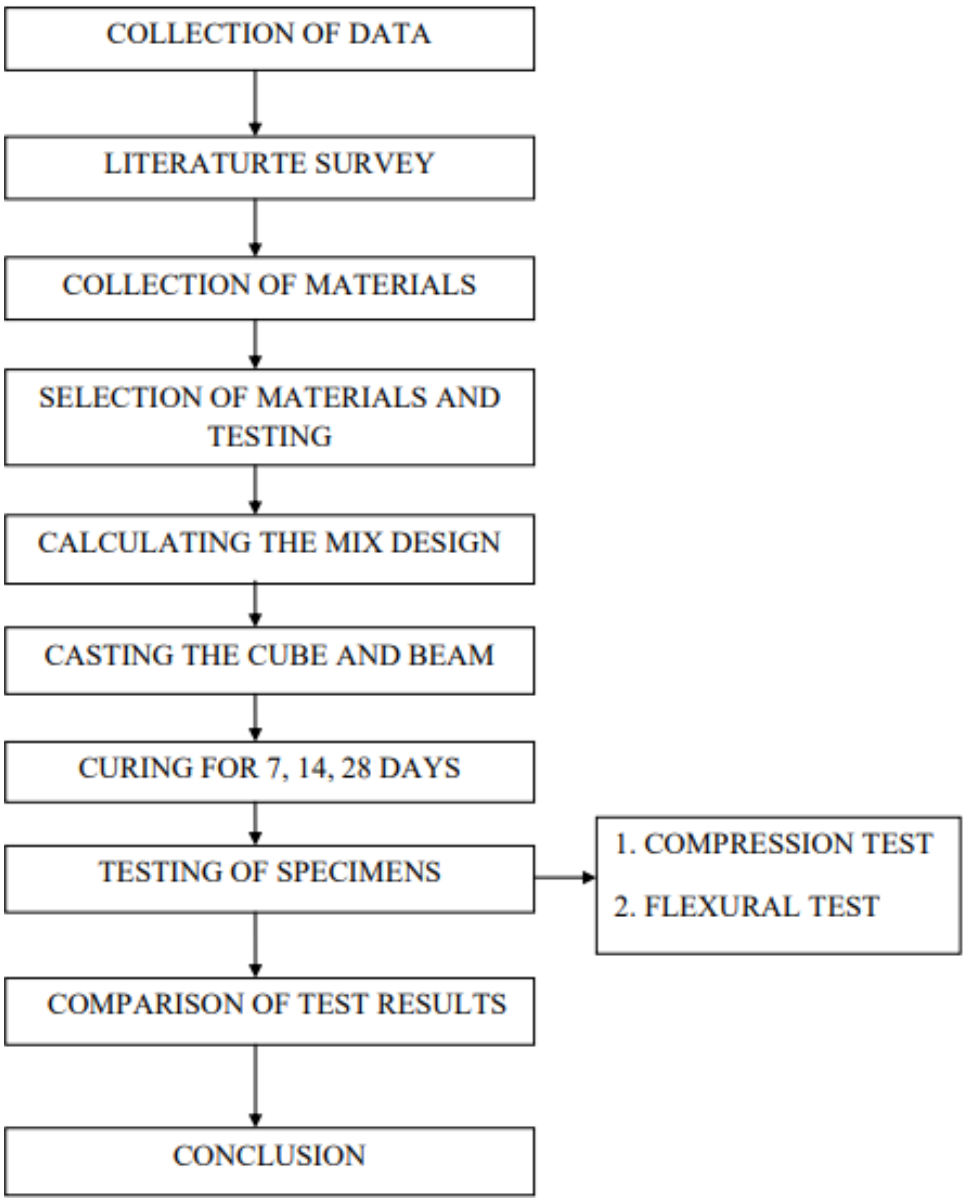

Fig.1. Methodology flowchart

Constituents Materials

Materials that are used for making concrete for this study were tested before casting the specimen. The preliminary tests were conducted for the following materials.

1. Cement

2. Fine aggregate

3. Coarse aggregate

4. Water

5. Magnetic soil

Mix Design

Design mix is a process to prepare concrete by testing all necessary properties (like properties of cement, fine aggregate and coarse aggregate) of concrete ingredients. Ingredients of concrete are mixed on the basis of weight.

Design Stipulations For Proportioning

a. Type of cement : M25

b. Grade Designation : OPC-53 grade

c. Maximum nominal size of aggregate : 20mm

d. Minimum cement content : 320 kg/m3

e. Water cement ratio : 0.50

f. Workability : 75mm

g. Exposure condition : Mild

h. Degree of supervision : Good

i. Type of aggregate : Angular aggregate

j. Chemical admixture : Not recommended

k. Maximum cement content : 450kg/m3

Test Data for Materials

a. Cement used : OPC -53 grade

b. Specific gravity of cement : 3.15

c. Specific gravity of fine aggregate : 2.5

d. Specific gravity of coarse aggregate : 2.5

e. Water absorption of Coarse aggregate : 1.0%

f. Water absorption of Fine aggregate : 1.0%

Experimental Investigation

The material, mix properties, manufacturing and curing of the specimen are explained. This is then followed by the description of types of specimen used, tests parameters and test procedure. Development of the process of masking magnetic sand concrete.

Fig.2. Mixing of concrete

Fig.3. Compaction of concrete by tamping rod

Results and Discussion

The test results of compression and flexural strength for various curing periods (7, 14 and 28 days) with 10%, 15% and 20% magnetic sand replaced concrete. Were analyzed and represented by using bar charts as shown in below.

Compressive Strength and Flexural Strength

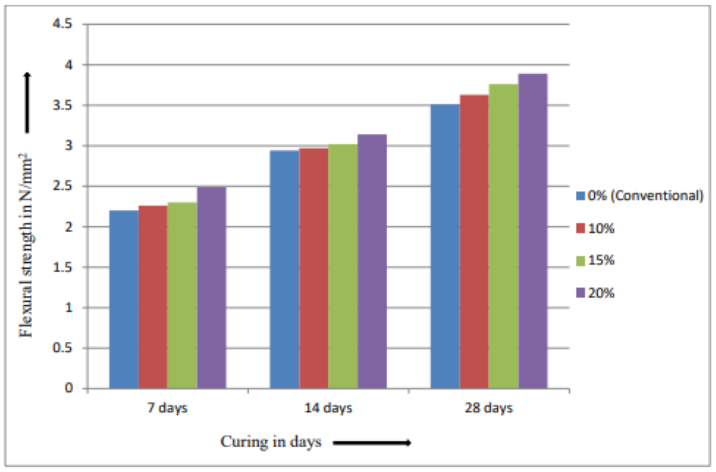

Fig.4. Bar chart for Compressive strength test

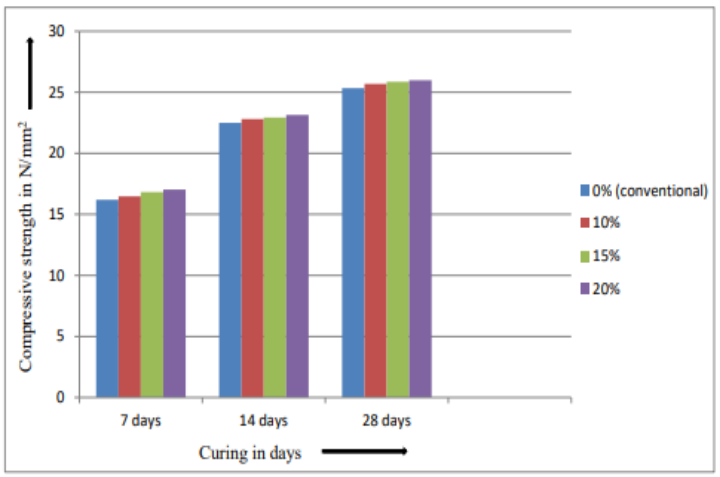

Fig.5. Bar chart for Flexural strength test

Table 1. Comparison of compressive strength with % of magnetic sand

S.No	Test of concrete	0% (Conventional)	10%	15%	20%
1	7 days	16.20	16.48	16.82	17.03
2	14 days	22.50	22.81	22.93	23.13
3	28 days	25.34	25.68	25.86	25.98

Table 2. Comparison of flexural strength values with % of magnetic sand

S.No	Test of concrete	0% (Conventional)	10%	15%	20%
1	7 days	2.20	2.26	2.30	2.49
2	14 days	2.94	2.97	3.02	3.14
3	28 days	3.51	3.62	3.76	3.89

Conclusion

This analysis of study was conducted to evaluate the effect of using magnetic sand as a replacement of fine aggregate in concrete composites and also give an idea using these materials within specific range. Several tests were conducted on the materials of the concrete composites and the reports are noted. From this study we can understand the exact percentage of increasing compressive strength and flexural strength of the concrete moreover, durability results. Study experimental in this shall prove the results.

The strength parameters such as compressive strength, flexural strength of magnetic sand concrete of various percentages are found. Addition of magnetic sand in concrete makes it resists shrinkage and cracks in concrete. The replacement of magnetic sand in concrete mixes improves the compressive strength (4%) and flexural strength (10%) at 28 days for magnetic sand mixes when compared with that of conventional concrete mixes. Because of insert chemical nature of magnetic sand when it is used in concrete it will not undergo any chemical reaction and also it is an eco-friendly material.

Declarations

Source of Funding

This research did not receive any grant from funding agencies in the public or not-for-profit sectors.

Consent for publication

Authors declare that they consented for the publication of this research work.

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