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PARTIAL REPLACEMENT OF SAND BY STEEL SLAG IN ORDINARY CONCRETE

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ABSTRACT- ***Concrete is having several advantages in technical,economic& environmental terms, especially on the environmental aspects moves the research towards recycling industrial by-products, as steel slag. This paper presents the results of an investigation to study the performance of compacting concrete prepared with utilizing steel slag in concrete mix proportions ranging from M25 grades of concrete as a partial replacement material for fine aggregate at 10%,20%&30%. Use of steel slag as by- product from the steel industries in concrete may help to conserve natural resources and at the same time be an economically positive option mechanical properties of the concrete with steel slag aggregates were found and the experimental results obtained show that the strength of concrete attain an optimum value at a particular replacement percentage of natural aggregate by steel slag & further replacement affect negatively the strength of concrete.***

INTRODUCTION:

Concrete is the widely used man-made construction material. It is obtained by mixing cement, water and aggregate (and sometimes admixtures) in required proportions. The mixture when placed in forms and allowed to cure becomes hard like stone. The hardening is caused by chemical action between water and the cement and it continues for a long time, and consequently the concrete grows stronger with age. The hardened concrete may also be considered as an artificial stone in which the voids of larger particles (coarse aggregate) are filled by the smaller particles (fine aggregate) and the voids of fine aggregate are filled with cement. In a concrete mix the cement and water from a paste called cement water paste which in addition to filling the voids of fine aggregate acts as binder on hardening, thereby cementing the particles of the aggregate together in a compact mass.

The concrete has high compressive strength, but its tensile strength is very low. In situations where tensile stresses are developed the concrete is strengthened by steel bars forming a composite construction called reinforced cement concrete (RCC). The concrete without reinforced is termed plain cement concrete or simply as concrete. The process of making concrete is called concreting. Sometimes the tensile stresses are taken care of by introducing compressive stresses in the concrete so that the initial neutralizes the tensile stresses. Such a construction is known as progressed cement concrete construction.

SCOPE:

This investigation intent to evaluate the effect of plasticizer on concrete. When plasticizer are used as water reducer, the dosage that was taken for present study is 0.6,1.05 and 1.5 Lits/1000kg of cement but the value recommended by the manufacture are 0.6 to 1.5Lts/100Kg cement. A concrete grade M25 as designed as per SP 430 1982 for this concrete mix the water cement ratio 0.45 was adopted.

OBJECTIVE:

- The objective of the project is to carryout experimental investigation on the workability of the concrete using steel slag

- To study the variation in compressive strength of the concrete by the addition of admixture 14% by the volume of water added in to the concrete.
- By the addition of admixture if workability increases, than what is required it is proposed to study whether any reduction in water/cement ratio is possible and is also proposed to study the effect of reduction in water cement ratio on strength of concrete.

MATERIALS:

- ✓ **Cement**
- ✓ **Fine aggregate**
- ✓ **Coarse aggregate**
- ✓ **Steel slag**

Sand

EXPERIMENTAL PROCEDURE:

Cement is a well known building materials and has occupied an indispensable place in construction works. There is a variety of cements available in the market and each type is used under certain condition due to its special properties. A mixture of cement and sand when mixed with water to form a paste is known as cement mortar whereas the composite product obtained by mixing cement, water and an inert matric of sand and gravel or crushed stone is called cement concrete. The distinguishing property of concrete is its ability to harden under waters.

The cement commonly used in Portland cement, and the fine and coarse aggregate used are those that are usually obtainable, from nearly sand, gravel or rock deposits. In order to obtain a strong, durable and economical concrete mix, It is necessary to understand the characteristics and behaviour of the ingredients of the concrete can be classified into two groups, active and inactive. The active group consists of cement and water, whereas inactive group comprises fine and coarse aggregate. The inactive group is also sometimes called the inert matrix. In this section the ingradient of the active group will be discussed.

Although all materials that go into a concrete mixture are essential cement is by far the most important constituent because its usually the delicate link in the chain.

The function of cement is first , to bind the sand and coarse aggregate together, and second , to fill the voids in between sand and coarse aggregate particles to form a compact mass. Although cement constitutes only about 10 percent of the volume of the concrete mix, it is the active portion of the binding medium and the only scientifically controlled ingredient of concrete.

TABLE 1. properties of materials:

MATERIAL	SP.G	UNIT.WT (kg/m^3)
cement	3.1	1440
Fine aggregate	2.67	1200
Coarse aggregate	3.0	1450
Steel slag	3.2	160

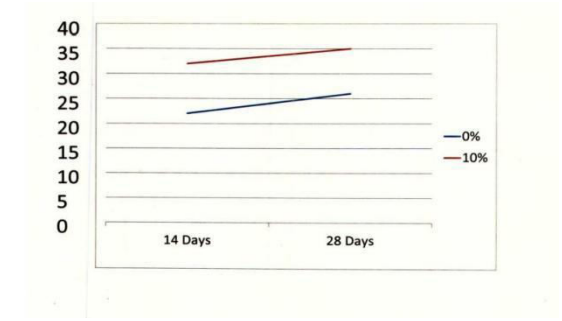
TEST ON BLOCKS:

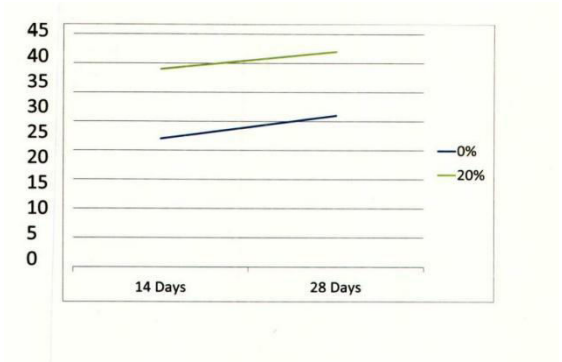
COMPRESSION TEST:

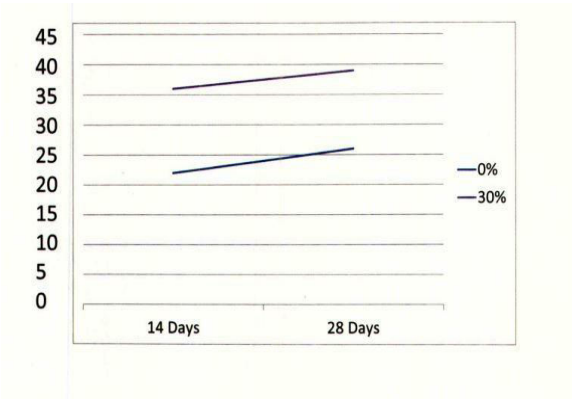
The most important strength test for the concrete is the compression test. It may be conducted either on specimens prepared in the laboratory or on specimens prepared in the field during the progress of the work. The test conducted on laboratory prepared specimen is called the preliminary test. While the test conducted on specimen made on concrete taken at the mixer is called the work test. The compression test can be conducted either on cubical specimens or on exceed 30mm,the size of the cube should be 15cm X 15cm X 15cm. If the largest nominal size of the aggregate does not exceed 20mm,10mm cubes may be used as in alterative.

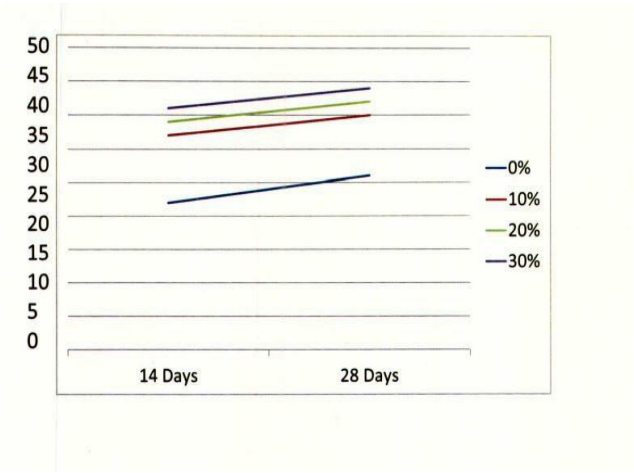
TABLE 2. COMPRESSION STRENGTH RESULTS OF BLOCKS:

Testing	Compressive strength N/mm2	
Days	14 days	28 days
Normal concrete	22	26
10% Replacing steel slag	32	35
20% Replacing steel slag	34	37
30% Replacing steel slag	36	39









CONCLUSION:

- This investigation intents to evaluate the effective utilization of steel slag on concrete. When steel slag is used as a material replaces sand, cement content by 10% 20% and 20% in available concrete respectively.

- A concrete grade M25 was designed as per IS 10262: 2000 for this concrete mix. The water cement ratio 0.45 was adopted.

- The main aim of this investigation to find the improvement in compressive strength of a given mix by reducing the water content from 0% to 20%

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- Concrete is the most widely used man-made construction material. It is obtained by mixing cement, water and aggregates (and sometimes admixtures) in required proportions.

- The mixture when placed in forms and allowed to cure becomes hard like stone. The hardening is caused by chemical action between water and the cement and it continues for a long time, and consequently the concrete grows stronger with age.

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