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STEEL SLAG AS REPLACEMENT OF FINE AGGREGATE IN TERMS OF HIGH STRENGTH CONCRETE

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ABSTRACT

The Steel slag, a result of steel making, is delivered amid the detachment of molten steel from polluting influences in steel making heaters. This can be utilized as sand in concrete. Steel slag sand by and large display a penchant to extend on account of the nearness of free lime and magnesium oxides that have not responded with the silicate structure and that can hydrate and grow in muggy conditions. This possibly far reaching nature (volume switches up to 10 percent or more owing to the hydration of calcium and magnesium oxides) could cause troubles with items containing steel slag, and is one motivation behind why steel slag aggregate are not utilized as a part of concrete development. The present research work deals with a view to develop efficient concrete by addition of steel slag to evaluate the effectiveness of the use of steel slag as a partial replacement in sand To replace Sand with various percentages 10, 20, 30, 40% of steel slag waste in M25, M30 & M35 concrete. Investigation have been carried out to study the effect of steel slag on various property of concrete like compressive, split tensile, flexural strength.

KEYWORDS: Steel Slag, Flexure Strength, Cement, Sand, Aggregate, Tensile Workability.

I. INTRODUCTION

Aggregate in concrete is generally known as construction aggregate. Aggregates are commonly used as inert filler within a concrete mix but it plays an important role in terms of both fresh and hardened concrete. Performance of concrete mix is altered by character like changes in gradation, maximum size, unit weight and. Thoughtful aggregation selection is another economical way by selecting aggregate of maximum allowable size because by the use of larger coarse aggregate typically lowers the cost of concrete mixes by the reduction of cement content and many more costly ingredients The higher measure of sand consumption makes delicate ecological harms. Government is currently a day's prohibiting the sand mining, which is influencing the cost of the materials and time of the culmination of development extend works. On the off chance that this broad usage of sand proceeds in future, the sand may get totally exhausted from the stream beds. To conquer this issue, it is extremely important to scan for the option materials for concrete creation and in development exercises Steel slag are being utilized as aggregates in black-top clearing street blends because of their mechanical strength, solidness, porosity, wear resistance and water ingestion limit. Steel slag for the most part shows the possibility to extend because of the nearness of un- hydrated free lime and magnesium oxides which hydrate in moist situations. In the event that such an item is utilized as a part of the concrete, it impacts both the mechanical and physical properties of concrete alongside its toughness.

II. OBJECTIVES

To determine optimum dose of alternative materials such as steel slag as partial replacement of sand respectively The study focuses to determine the relative performance of concrete by using above waste products To replace Sand with various percentages 10, 20, 30, 40% of steel slag waste in M25, M30 & M35 concrete To search alternatives material which can fully or partially replaced naturally available material in construction To study the effect of compressive, split tensile, flexural strength characteristic properties of steel slag waste in concrete

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Coarse Aggregate

The fractions from 20 mm to 4.75 mm are used as coarse aggregate. Machine crushed angular granite metal of 20 mm nominal size from the local source was used as coarse aggregate. It was free from impurities such as dust, clay particles and organic matter etc. The coarse aggregate chosen for Concrete was typically angular in shape, well graded, and smaller than maximum size suited for conventional concrete. The physical properties of coarse aggregate were investigated in accordance with IS 383 - 1970

Water

Water is an important ingredient of concrete as it actually participates in the chemical reaction with cement. Since it gives the strength to cement concrete, the quantity and quality of water are required to be looked into very carefully. Potable tap water free from any injurious amounts of oils, acids, alkalis, sugar, salts and organic materials available in the laboratory with pH value of 7.0 ± 1 and confirming to the requirements of IS: 456 - 2000 [4] was used for mixing concrete and curing the specimens as well

III. RESULTS AND DISCUSSION

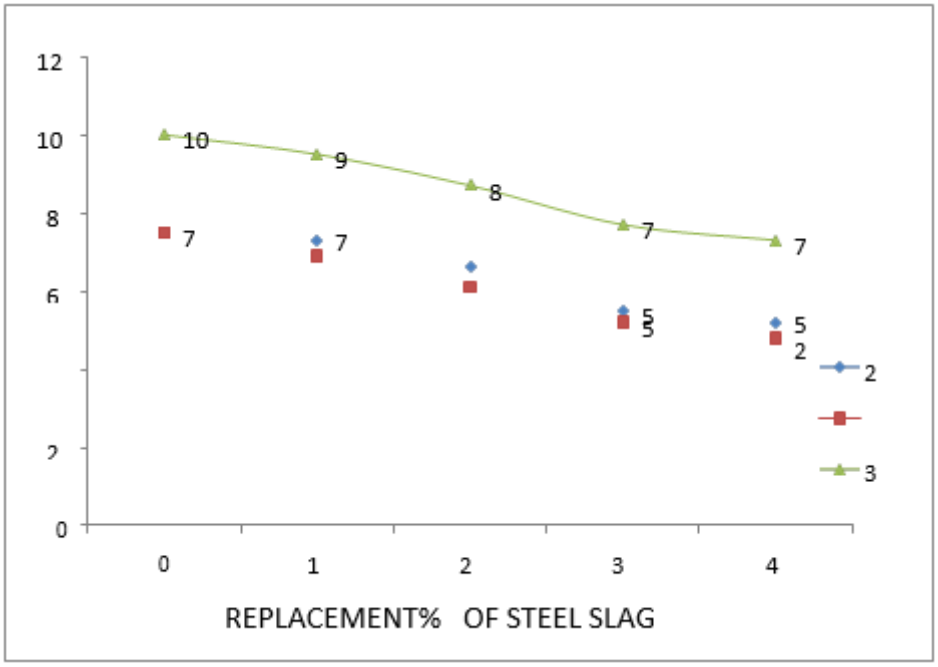

Fig:1 Slump Values of Concrete having Different Composition of steel slag

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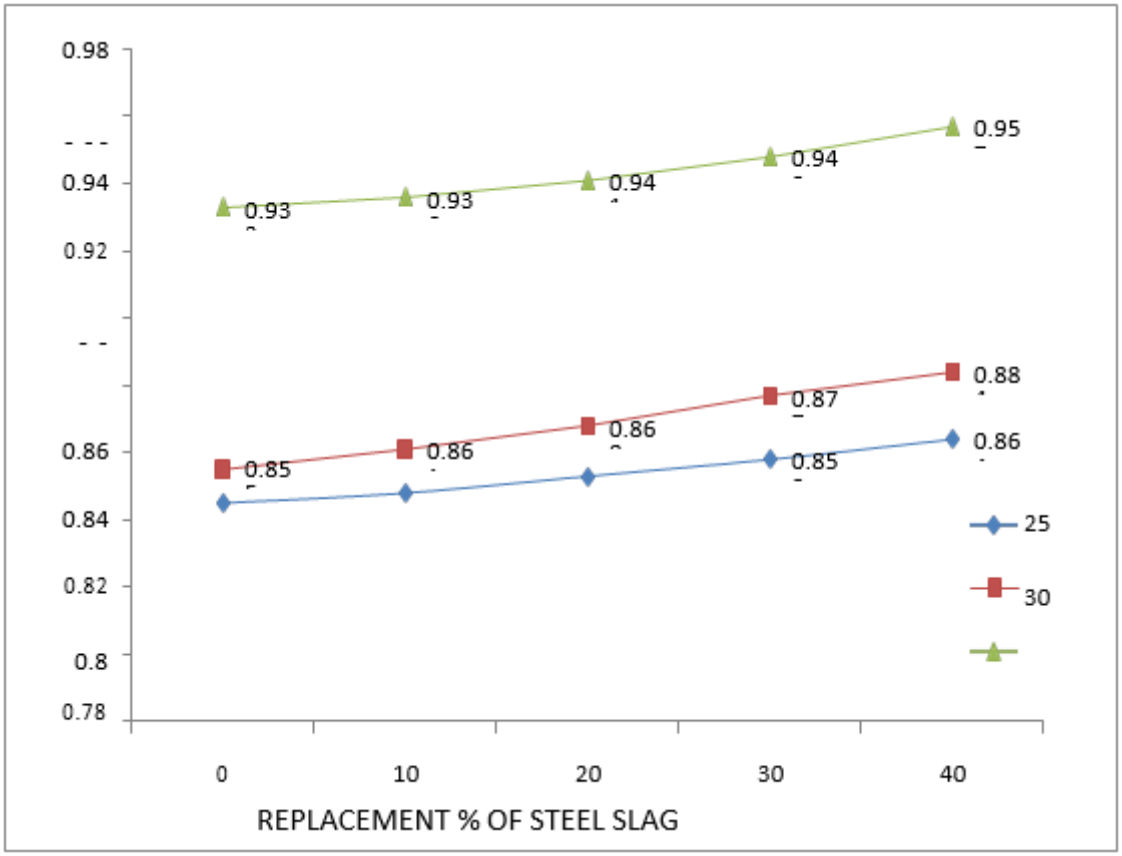

Fig 2 Compaction Factor Of Concrete Having Different Composition Of Steel Slag

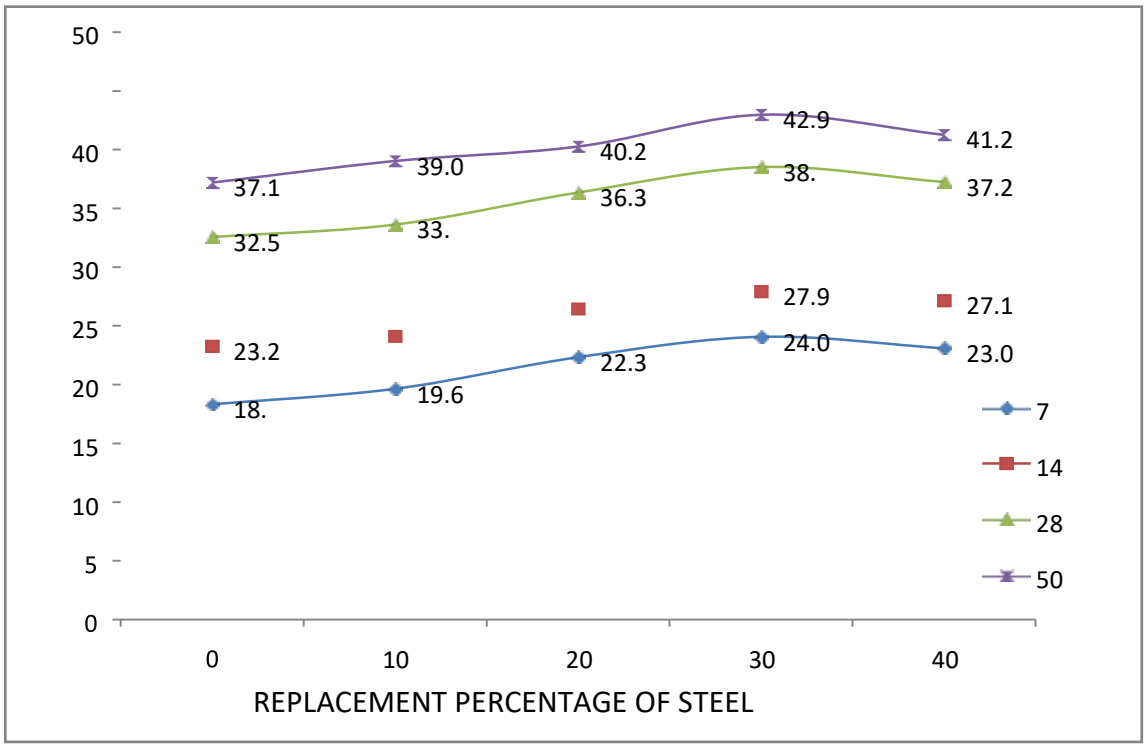

Fig 3: Compressive Strength graph for M-25 Grade with Steel Slag

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IV. CONCLUION

Conclusion drawn from this study is given below

1. Compressive Strength Reading (for the typical estimation of three piece test) at 7, 14, 28 and 50 days are higher than with the use as partial substitution of steel slag by sand with the level of 10, 20, and 30%, lower than 40% of steel slag show up particularly in association with other creation block shape cases with M-25, M-30, M-35 review of concrete. The increment in compressive strength of M 25 is noted 31.47% for 7 days curing 20% for 14 days curing 18% for 28 days while at 40% a slight decrement of 4.2% noted for 7 days and 3.4 % for 28 days of curing as compared to 30%
2. The increment in flexural strength test is about 36.7% for 28 days curing for M 25 grade of concrete and 24.7% for 28 days

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