EXPERIMENTAL INVESTIGATION ON WORKABILITY OF CONCRETE WITH PARTIAL REPLACEMENT OF CEMENT BY GROUND GRANULATED BLAST FURNACE AND SAND BY QUARRY DUST

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ABSTRACT

Concrete is the most widely used construction material in civil engineering industry because of its high structural strength and stability. Cement and sand is a major constituent material of the concrete which produced by natural raw material like lime and silica and natural sand respectively. Once situation may occurs there will be no lime on earth production of cement also natural sand. This situation leads to think all people working in construction industry to do research work on cement replacing material and natural sand for use of it. The construction industry is constantly looking for supplementary cement and natural sand material with the objective of reducing the solid waste disposal problem. Ground granulated blast furnace slag (GGBS), quarry sand are the solid wastes generated by Industry. To overcome from this crisis, partial replacement of Cement with GGBS, natural sand with quarry sand (QS) can be an economic Alternative. The cubes are tested for compressive strengths. Ordinary Portland cement was partially replaced by GGBS of 0%, 30%, 40%,50% and natural sand replacement by QS 0%, 40%, 50%, 60%.

Keyword - *GGBS, QS, slump test flexural test , economic Alternative.*

I.INTRODUCTION

Concrete is a heterogeneous mix of cement, fine aggregate and coarse aggregate. It is the most widely used construction material in civil engineering industry because of its high strength. Most of the researchers working in concrete area to modify the concrete properties by using various cementitious materials along with optimizing the cost of concrete. GGBS in concrete is used for the purpose of economy and at the same time GGBS contributes in better durability, reduced permeability, reduction in W/C ratio, reduction in expansion due to alkali aggregate reaction,and improved long term strength and most important by reduction in cement content.

II.OBJECTIVE

- To utilize the ground granulated blast furnace slag in the concrete as a partial replacement of cement.
- To reduce the environmental problems.
- To reduce the consumption of natural sand .

III.LITERATURE REVIEW

Venkata Sairam Kumar et al. have studied on Partial Replacement Of Cement With Quarry Dust. Quarry dust is a waste from the stone crushing unit accounts 25% of the final product from stone crushing unit. They have concluded that this quarry dust which is released directly into environment can cause environmental pollution. To reduce the impact of the quarry dust on environment and human, this waste can be used to produce new products or can be used as admixture in concrete so that the natural resources are used efficiently and hence environmental waste can be reduced. In this research paper quarry dust is used for partial replacement of cement in concrete to study the strength property of concrete. The aim of the experiment was to find the maximum content of quarry dust used as partial replacement of cement in concrete. The percentages of quarry dust as

partially replacement of cement in concrete ware 0, 10%, 15%, 20%, 25%, 30%, 35%, and 40%.From the experimental studied 25% of partial replacement of cement with quarry dust improves hardened concrete properties

H. S. Sureshchandra et al. have studied on the Effect of Replacement of Sand by Quarry Dust in Hollow Concrete Block for Different Mix Proportions. In this paper an attempt has been made to determine the properties of hollow concrete blocks produced by replacement of sand by quarry dust. Both partial (i.e.50%) and complete replacement has been tried with and without admixtures.

Baboo Rai et al. has studied on effect of Fly Ash on Mortar Mixes. This paper presented the results of an experimental investigation carried out to evaluate the compressive strength and transverse strength of 1: 3mortar mixes in which natural sand was replaced with 20%, 50%, and 100% quarry dust by weight which was further modifiedby partially replacement of cement with different proportion (15%, 20%, 25%, and 30%) of low calcium fly ash. Test results revealed that the combined use of quarry rock dust and fly ash exhibited excellent performance due to efficient micro filling ability and pozzolanic activity.

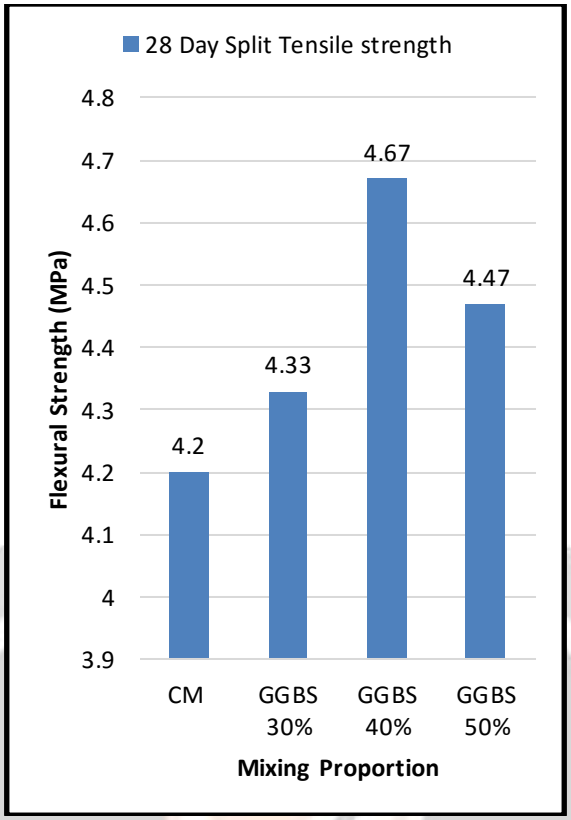
IV.MATERIALS USED

This Para is concerned with the used of the materials,

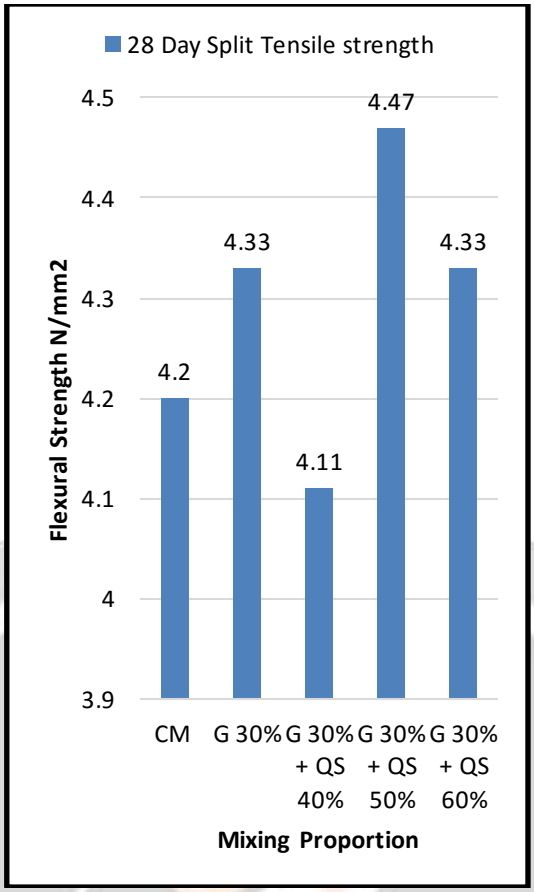
1. Cement-53 Grade (OPC)
2. Aggregates
    a) Coarse Aggregate
    b) Fine Aggregate
3. Ground Granulated Blast Furnace Slag (GGBS)
4. Quarry Sand
5.

V.RESULT AND DISCUSSION

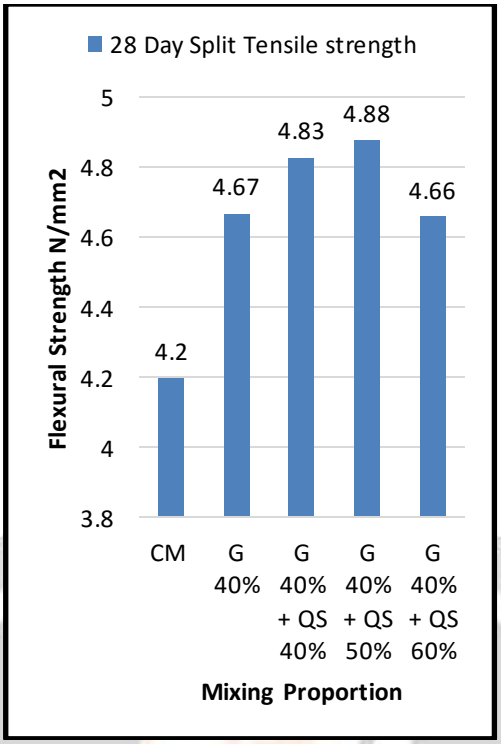
Mixing Proportion	28 Day Split Tensile strength
CM	4.2
GGBS 30%	4.33
GGBS 40%	4.67
GGBS 50%	4.47



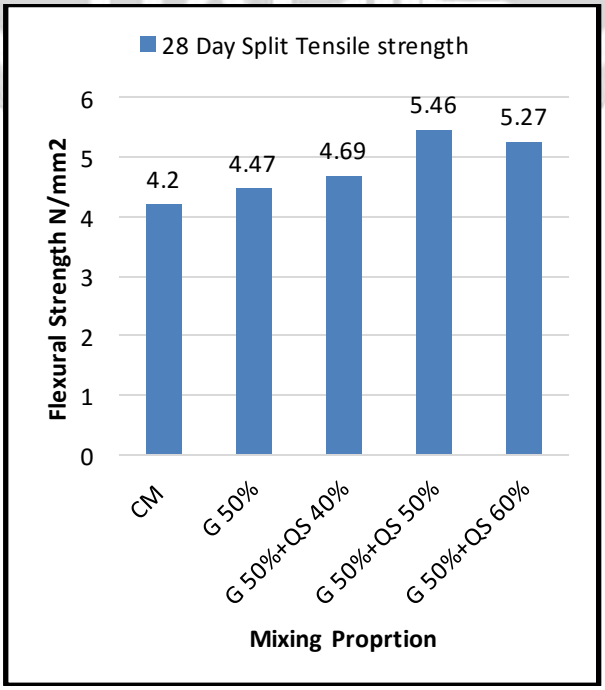
Mixing Proportion	28 Day Split Tensile strength
CM	4.2
G 30%	4.33
G 30%+QS40%	4.11
G 30%+QS50%	4.47
G 30%+QS60%	4.33



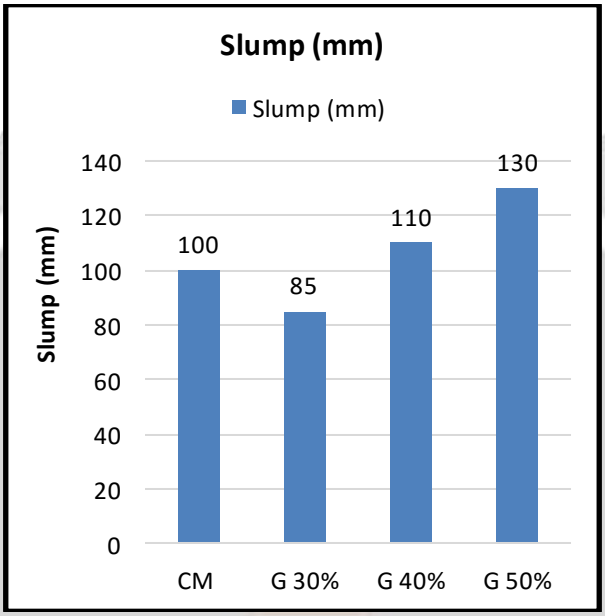
Mixing Proportion	28 Day Split Tensile strength
CM	4.2
G 40%	4.67
G 40% + QS 40%	4.83
G 40% + QS 50%	4.88
G 40% + QS 60%	4.66



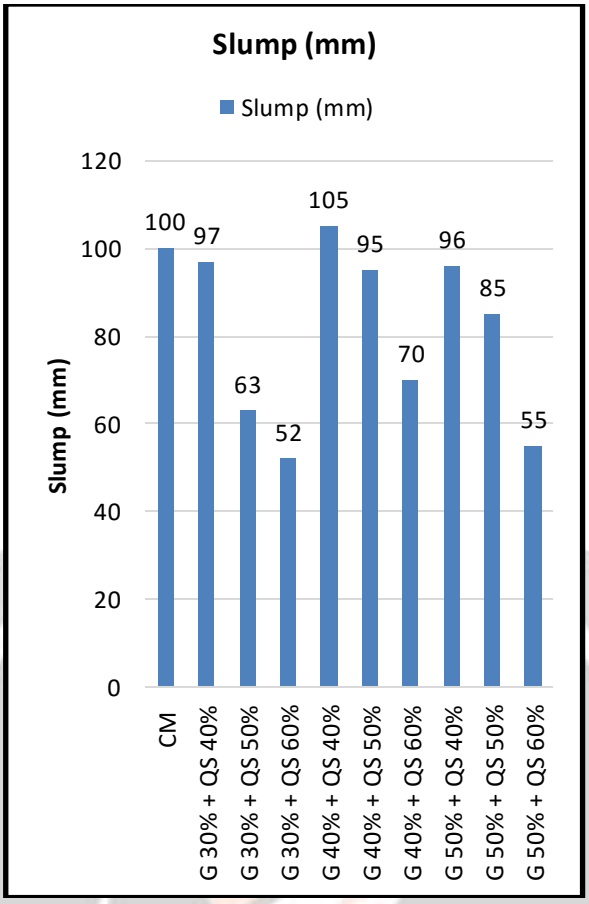
Mixing Proportion	28 Day Split Tensile strength
CM	4.2
G 50%	4.47
G 50%+QS 40%	4.69
G 50%+QS 50%	5.46
G 50%+QS 60%	5.27



Mixing Proportion	Slump (mm)
CM	100
G 30%	85
G 40%	110
G 50%	130



Mixing Proportion	Slump (mm)
CM	100
G 30% + QS 40%	97
G 30% + QS 50%	63
G 30% + QS 60%	52
G 40% + QS 40%	105
G 40% + QS 50%	95
G 40% + QS 60%	70
G 50% + QS 40%	96
G 50% + QS 50%	85
G 50% + QS 60%	55



5.0 CONCLUSION

Based on the experimental investigation the following conclusion are drawn

- The workability of concrete was found to be increases with the increase in GGBS in concrete. It further decreases as the percentage of Quarry Sand increases.
- Maximum flexural strength has been obtained for replacement of cement by 40% GGBS.
- Maximum flexural strength achieved for cement replacement by 50% GGBS and sand by 50% QS.

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