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COMPARATIVE STUDIES OF COMPRESSION AND FLEXURAL STRENGTH ON HIGH STRENGTH CONCRETE BY USING ALCCOFINE AND FLYASH

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ABSTRACT

These paper presents the experimental investigation on High strength concrete by using varying percentage 0, 5, 10, 15, 20 of alccofine and fly ash, at constant 0.6% of superplasticizers admixtures which is replaced by weight of Portland pozzolana cement and design M- 50 grade of concrete. The comparative studies of compressive and flexural strength of the concrete by varying percentage of alccofine and fly ash. The mix proportions of concrete had a constant percentage of superplasticizers which is based on the required degree of workability. The concrete specimens are curing at 7 and 28 days under normal atmospheric temperatures. The results of adding alccofine gives the excellent results. The proportion mix can achieve their characteristics strength at by adding 10% of alccofine in replacement of PPC and after addition of 10% alccofine shows that strength decreases and also find that alccofine gives rapid result than fly ash.

KEYWORDS:-High strength concrete, Alccofine, Flyash, compression strength, flexural strength.

I. INTRODUCTION

In all over the INDIA the infrastructure developments keeping a view of requirements of high strength concrete in the construction sector for high rise building ,bridges etc. High strength concrete makes by using locally available coarse aggregate, fine aggregate and Portland pozzolana cement with alccofine and super plasticizer admixtures with varying properties of these materials has been presented in the project work.

Alccofine is property of low calcium silicate. It is low calcium silicate based mineral additive. It granulation is controlled by process and results in unique particle size distribution. Its gives latent hydraulic property and pozzolanic reactivity results in hydration process of concrete. Alccofine improves the packing density of paste component and due to improve packing density lowering water demand, lowering admixture dosage and hence improving strength and durability parameters of concrete at all ages. Alccofine is a new generation, micro fine material which much finer than other hydraulic materials like cement, fly ash, silica etc. being manufactured in India. Alccofine has unique properties to enhance the ‘performance of concrete' in fresh and hardened stages due to its much finer particle size. This paper envisages the use of alccofine as partial replacement of PPC in M-50

grade of concrete. The percentage replacement of PPC by alccofine was 0%, 5%, 10%, 15% and 20%. The test specimens (cubes) casted and tested as per relevant IS code of practice for 28 days compressive strength.

II. LITERATURE REVIEW

As per ***Sishminder Pal Singh***,: The effects of super plasticizer on fresh and hardened concrete were investigated. The experiment program included test on workability, slump loss and compressive strength. In this experimental works we are comparing the properties of super plasticizer based concrete with that of without super plasticizer added concrete. Super plasticizer permitted a significant water reduction while maintain the same workability. To study the effect of super plasticizer the experiment has been divided into four series namely workability series, water reduction series and cement saving series, compressive strength.

As per ***P.D Kumbharet.al*** *, "A New Mix Design Method For High Performance Concrete Under Tropical Condition'* In Tropical countries usually show substantial variations in temperature and humidity.. This paper presents a new method for proportioning High performance concrete mixes considering effects of varying humidity and temperatures by exposing them to different artificially created environments. Proposed method is experimentally found to be valid and provides mix proportions giving desired workability and strengths.

As per ***Amar S.Deshmukh****, "Development of mix design for high strength concrete"* The process of determining experimentally the most suitable concrete mixes in order to achieve maximum strength with the least expenditure. In this research work the locally available constituent of concrete as per prevalent practice were selected for the purpose of determining their relative quantities and proportion for the best result. Generally High Strength Concrete all over the world is developed experimentally before use.

III. MATERIAL USED

The various materials that are used in this research are as follow:-

3.1 Cement

Cement of grade

PPC is used that is commercially available in Indian market. The properties of the cement are as confirming to IS: 1489:1991.

3.2 Fine Aggregate

Sand of grading Zone II confirming to IS:383-1970 is used that is available commercially. The specific gravity of the sand is calculated as 2.60.

3.3 Coarse Aggregate

Crushed angular coarse aggregates of 20mm nominal sizes are used. The specific gravity of the aggregate is 2.64.

3.4 Alccofine

Alccofine has unique properties to enhance the 'performance of concrete' in fresh and hardened stages due to its much finer particle size. Alccofine is manufactured by some controlled conditions with special technique to produce micro fine size. Alccofine is generally two types one is low calcium silicate which is Alccofine 1203 and other is high calcium silicate which is Alccofine 1101.

3.5 Fly ash

All precast concrete producers uses a material called fly ash which improve the property and quality of their concrete. Fly ash is a group of materials which is vary significant in composition Fly ash is mostly pozzolanic which contains siliceous and aluminous materials which reacts with calcium hydroxide of cement and form C-S-H gel. Fly ash improves the strength of concrete. It is added up to 05-35% by weight of cement.

3.6 Water

Fresh water was used for preparation of concrete mix as well as for the curing of the samples created during the project.

3.7 Concrete Mix

The concrete mix designed was of M50 grade by using Alccofine and fly ash confirming to IS:10262- 2009. The proportion of various components per m^3 of concrete. The mix proportion of this investigation was 1:1.69:3.12 for alccofine and 1:1.58:2.92 for flyash concrete was adopted.

IV. EXPERIMENTAL PROCEDURE

The concrete mix was designed confirming to IS: 10262-2009 and concrete beams cubes were cast for different replacement percentages of cement by Alccofine and Fly ash.. The cement was replaced by 5%, 10%, 15% and 20% by weight of alccofine and fly ash respectively using one at a time. The beams casted were of the dimensions of 500mm*100mm*100 mm and the dimension of the cubes was 150mm* 150mm* 150mm. The samples were cured in fresh water for 7 and 28 days. Then the beams were tested to calculate the flexural strength and the cubes were tested for compressive strength at 7 and 28 days confirming to IS: 516-1959 and comparative graphs showing the values of flexural strength and compressive strength for different mineral admixtures as partial replacement of cement were drawn.

V. RESULT AND DISCUSSION

Flexural strength test:- The flexural strength test was conducted on beam specimens by manual flexural strength testing machine. The beams were tested on 7 and 28 days after curing in fresh water at 27C. Separate graphs were drawn for 7 and 28 days to show the variation of flexural strength with different amount of replacement of cement by different admixtures. The value of flexural strength for different level of replacement of cement is given in Table for M 50 grade of concrete and the graphs for 7 and 28 days are given in fig.1,2,3 and fig.4 respectively.

Table 1: Compressive strength of M50 grade at varying . % of alccofine and flyash

SI NO.	% replacement of cement by Mineral admixture (%)	Compressive strength(N/mm^2)			
		7 Days(N/mm^2)		28Days(N/mm^2)	
		Fly ash	Alccofine	Fly ash	Alccofine
1	0	24.21	24.21	34.70	34.70
2	5	26.53	29.26	38.20	42.72

3	10	29.33	33.60	39.26	47.95
4	15	30.31	30.03	39.34	43.12
5	20	28.04	26.49	36.76	37.26

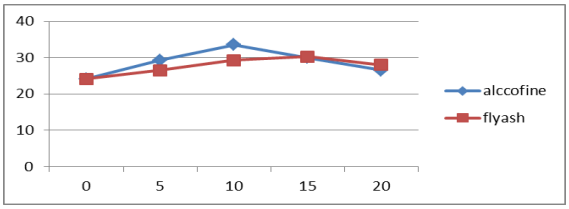

Fig 1 :- 7 days compressive strength of M50 grade

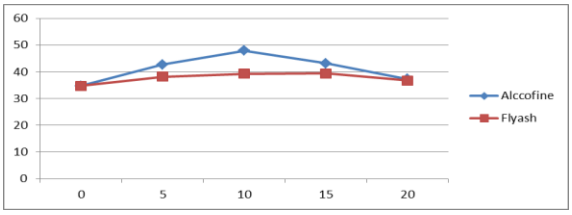

Fig 2 :- 28 days compressive strength of M50 grade

Table 1:Flexural strength of M50 grade at varying % of alccofine and flyash

SI NO.	% replacement of cement by Mineral admixture	Flexural strength(N/mm^2)			
		7 Days(N/mm^2)		28Days(N/mm^2)	
		Fly ash	Alccofine	Fly ash	Alccofine
1	5	5.3	5.8	5.8	6.3
2	10	5.6	6.3	6.1	6.5
3	15	5.9	5.7	6.4	5.8
4	20	5.7	5.29	6.12	5.4

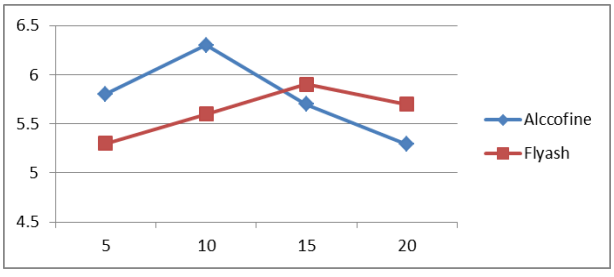

Fig3:- 7 days graph for flexural strength of M50 grade

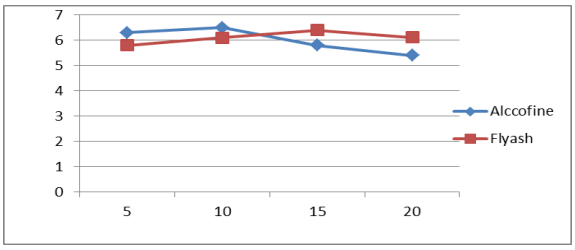

Fig4:- 28 days graph for flexural strength of M50 grade

VI. CONCLUSIONS

Alccofine gives the highest values of flexural strength and compressive strength as compared to Fly ash. The values obtained for Alccofine for maximum at 10% replacement and Fly ash are maximum for 15% replacement of cement after which the value decreases.

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