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Study on Effects of Fly-Ash and Tamarind Kernel Powder in Concrete

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***Abstract*—The conventional concrete has lost its usage in modern days as it does not serve the present needs. Hence in order to improve the properties of the concrete in the fresh and the hardened state, high performance concrete (HPC) is used. When using tamarind in concrete possess high workability, high strength, high dimensional stability, high durability, low permeability and resistance to chemical attack.This project deals with the effects of supplementary cementations materials in concrete by incorporating fly ash and tarmarind with a water binder ratio of 0.3.Here the conventional concrete is obtained by ordinary Portland cement is replaced with 10%, 20% 30% 40% and 50% of fly ash and also partial replacement of sand by tamarind powder From the experimental results, it is observed that concrete exhibits improved compressive strength, split tensile strength and flexural strength when compared with the conventional mix.**

Keywords— High performance concrete, fly ash, Tarmarind. Hardened properties

I. INTRODUCTION

In this chapter, a brief review of the findings of earlier investigations on the important properties parameters of fly ashes; the available literature on the mechanisms of lime-fly ash and cement-fly ash hydration processes influence of fly ash addition on the properties of concrete, workability and compressive strength , have been presented. A comprehensive review of the work of earlier investigators on blended cements; studies on the activation of low-calcium and high-calcium fly ashes and pozzolonas, have been also presented. An attempt has also been made to critically evaluate the status of activation studies on fly ash. Apart from the above, literature relevant to the work carried out in this study, namely, on mix proportioning methods; effect of elevated temperature; influence of various aggressive environments on blendedfly ash concretes, been briefly reviewed and presented.

II. MATERIALS

A. Fly Ash

Flyash is a by-product of the combustion of pulverized coal in thermal power plants. Flyash exhibits pozzolanic activity.

TABLE 2.1.1 PHYSICAL PROPERTIES OF FLY ASH

Sl. No.	*Particulars*	*Values*
1	Specific gravity	2.04
2	Fineness modulus	2.16
3	Consistency	29%
4	Initial setting time	110 minutes
5	Final setting time	235 minutes

TABLE 2.1.2 CHEMICAL COMPOSITION OF FLY ASH

Sl. No.	*Chemical component*	*% of chemical component*
1.	SiO_2	42
2.	Fe_2O_3	28
3.	Al_2O_3	22
4.	CaO	2
5.	MgO	1
6.	K_2O	1.30
7.	Na_2O	0.30
8.	SO_3	1

B.Super plasticizers

The new generation super plasticizer- 400 was used.

- Colour - Brown
- Type - Liquid
- Specific gravity - 1.175 at 30^0

Storage condition - in cool dry place shelf life - 1 year

The mix proportion were designed as per I.S.10262-2009, 1:1.23:2.19:0.38 (cement: fine aggregate: coarse aggregate: water) by weight of cement was used throughout.

III. RESULT

A. Workability

Workability of the high performance concrete is determined using slump test and the values are tabulated in Table 4.1.1

TABLE 4.1.1 WORKABILITY TEST RESULTS

Sample	%	m p
Normal concrete with in PCC	0	55
Normal concrete with in OPC	0	55
OPC concrete replacement of sand with Tamarind	100	52
OPC concrete replacement of cement with in flyash	10	51
OPC concrete replacement of cement with in flyash	20	50
OPC concrete replacement of cement with in flyash	30	44
OPC concrete replacement of cement with in flyash	40	43
OPC concrete replacement of cement with in flyash	50	40

B.Compressive Strength

Cubes and cylinder are casted and its values are tabulated and plotted.

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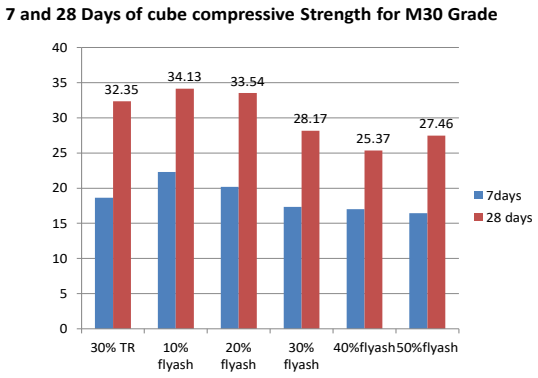

Fig 1 Cube compressive strength

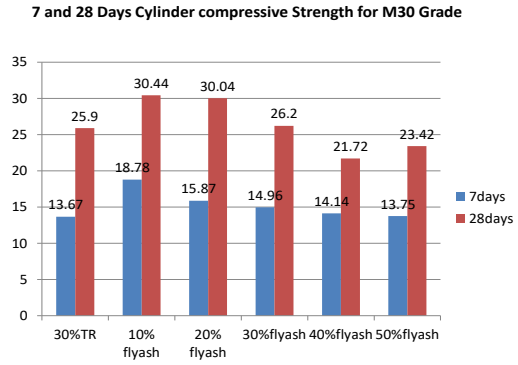

Fig 2 Cylinder compressive strength

C. Split tensile Strength

Cylinder is casted and its split tensile strength are determined and plotted.

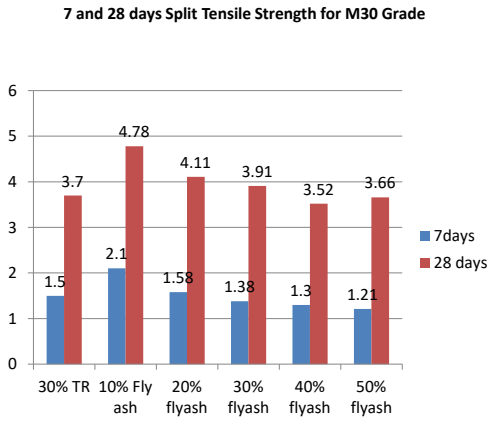

Fig 3 Split tensile strength

D. Flexural strength

Beam is casted and its test results are tabulated and plotted.

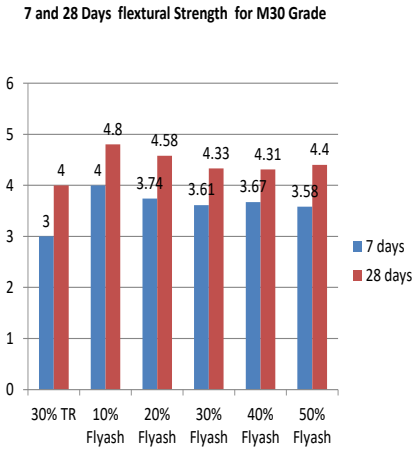

Fig 4 Flexural strength

IV. CONCLUSION

- The dosage of tamarind and fly ash has a significant effect on the compressive strength of concrete under normal curing. The concrete mixture with 10% Fly ash (M1) shows an improved compressive strength than concrete with 20% FA (M2)and the strength goes on decrease with 30%(M3),40%(M4),50%(M5) replacement at 7 days and 28days. The increase in curing period increases the strength of M1 concrete specimens and M2 concrete specimens at 7 and 8 days.
- The curing of 7 and 28 days compressive strength of (Tamarind+FA) mixture incorporating 30%, 40% and 50% FA was lower than control concrete under normal curing. This is because the pozzolanic reaction is slow and the formation of calcium hydroxide requires time.
- It is evident from the experimental results that the compressive strength decreases when the percentage of fly ash increases.
- The flexural strength similar to the compressive strength shows better results for 10 % and 20% replacement of fly ash and 30% replacement of tamarind powder instead of sand but it got reduced with 40% and 50% replacement Further mixes concludes that 10% and 20% replacement of fly ash gives a optimum strength for M30 Grade concrete compared to other replacement.

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