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EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF FINE AGGREGATE USING BAGASSE ASH

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***Abstract*—** This project titled "EXPERIMENTAL INVESTIGATIONS ON PARTIAL REPLACEMENT OF FINE AGGREGATE USING BAGASSE ASH" deals with increasing demand and consumption of fine aggregate for an alternate filler and excellent binder is bagasse ash are eco-friendly and contribute towards the required target strength of the concrete. Fibrous waste product obtained from sugar mill by product called bagasse. Replacement of fine aggregate as bagasse ash acts as excellent thermal insulator and it is partially replaced in the ratio of 20% 25% and 30% by weight of the fine aggregate. The properties of fresh concrete are tests are slump cone test and for hardened concrete is compressive strength test at 28 days of age.

I. INTRODUCTION

Due to Ozone depletion of earth temperature increases day to day. The Bagasse Ash is a good thermal insulator with property which is equals to glass fiber. Currently the world is poised for a major initiative in infrastructure development in construction of buildings and other structures where concrete plays a vital role in this initiative of development. Conventional building material such as cement, aggregate, steel and timber are increasingly becoming expensive and scarce. River sand, which is one of the constituents used in the production of conventional concrete, has become very expensive and also becoming scarce due to depletion of river bed. This goes a long way in environmental protection and ecological balance. In the recent past good attempts have been made for the successful utilization of various industrial by products to prevent environmental pollution. A number of attempts have been made to provide local alternatives to use of river sand as a fine aggregate in conventional concrete. In addition to this, an alternative source for the potential replacement of natural aggregates in concrete has gained good attention in order to minimize the cost and maximize the strength.

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In such a situation sugar cane Bagasse ash could be an economical alternative to the river sand in the construction process. This paper reports the experimental study which investigated the influence of Bagasse ash.

II. OBJECTIVE

- To improve the quality and reduce the cost of construction materials.
- Reduces negative environment effect and landfill volume.
- Valuable materials (Bagasse ash) obtained from the sugarcane mill by product.
- Utilization of waste is so effective .
- The use of Bagasse ash as fine aggregate contributes to sustainable development.

III. EXPERIMENTAL PROGRAMME

Twelve specimens were casted and tested in laboratory. River sand is partially replaced with baggase ash With various proportions such as 20%,25%,30% to the weight of sand and studied the 7, 14, 28 days compressive strength, flexural strength and tensile strength.

TEST MATERIALS ARE GIVEN BELOW:

A.Cement

Ordinary Portland cement (53 grade) whose specific gravity is 3.1, initial setting time is 45 minutes, final setting time is 200 minutes is used.

B.Fine aggregate

In this study zone II sand is used whose specific gravity is 2.86, fineness modulus is 2.1, bulk density is 33% is used.

C.Coarse aggregate

Coarse aggregate of size 20mm is used which has specific gravity 2.8, fineness modulus 4.76 as per IS 383.

D. Water

Portable water free from harmful oils, alkalis, sugar, organic impurities are used for proportioning and curing of concrete.

E. Bagasse ash

The sugarcane Bagasse consists of approximately 50% of cellulose, 25% of hemicelluloses and 25% of lignin. Each ton of sugarcane generates approximately 26% of Bagasse (at a moisture content of 50%) and 0.62% of residual ash. The residue after combustion presents a chemical composition dominates by silicon dioxide (SiO2).

F. Mix design

The following mix design is arrived:

WATER	CEMENT	FINE AGGREGATE	COARSE AGGREGATE
186Kg	372Kg/m^3	554kg/m^3	1203kg/m^3
0.50	1	1.49	3.2

IV. RESULTS AND DISSCUSSION

COMPRESSIVE STRENGTH VALUES OF SAMPLES

TYPE 1

S.NO	DAY	CRUSHING LOAD (KN)			AVERAGE (KN)
		SAMPLE1	SAMPLE2	SAMPLE3	
1	7	210	211.4	207.56	209.6
2	14	240	239.2	244.5	241.23
3	28	275	274,3	269.82	273.04

TYPE 2

S.NO	DAY	CRUSHING LOAD (KN)			AVERAGE (KN)
		SAMPLE1	SAMPLE2	SAMPLE3	
1	7	198	201.21	207.6	202.27
2	14	231	230.4	233.8	231.73
3	28	263	260.6	264.14	262.58

TYPE 3

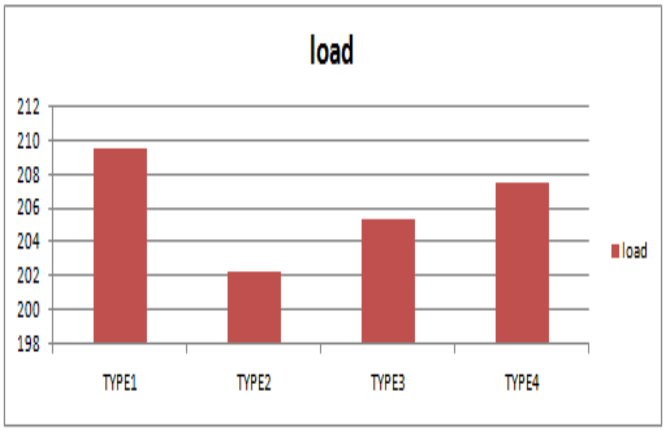
S.NO	DAY	CRUSHING LOAD (KN)			AVERAGE (KN)
		SAMPLE1	SAMPLE2	SAMPLE3	
1	7	203.25	204.3	208.6	205.38
2	14	232.6	231.5	236.8	233.63
3	28	263	265.87	268.14	265.29

TYPE 4

S.NO	DAY	CRUSHING LOAD (KN)			AVERAGE (KN)
		SAMPLE1	SAMPLE2	SAMPLE3	
1	7	205.5	207.6	209.43	207.51
2	14	236.5	233.4	239.8	236.56
3	28	270	265.4	271.7	269

ultimate load values for sample (7^{th} day)

SAMPLES	PERCENTAGE OF FINE AGGREGATE &BAGASSE ASH %	ULTIMATE LOAD (KN)
TYPE 1	100&0	209.6
TYPE 2	90&10	202.27
TYPE 3	80&20	205.38
TYPE 4	70&30	207.51

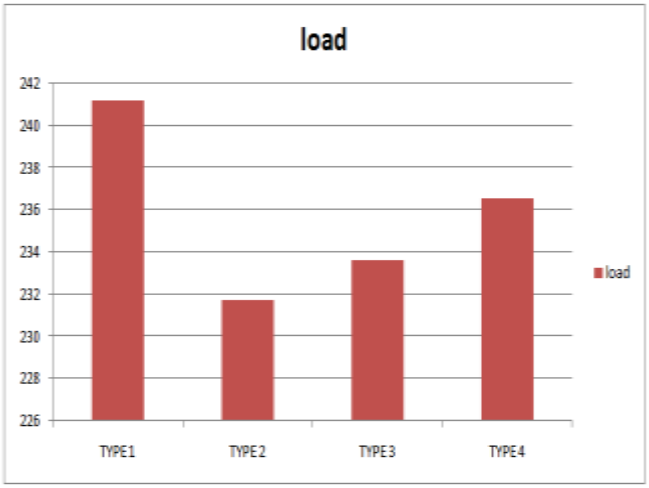


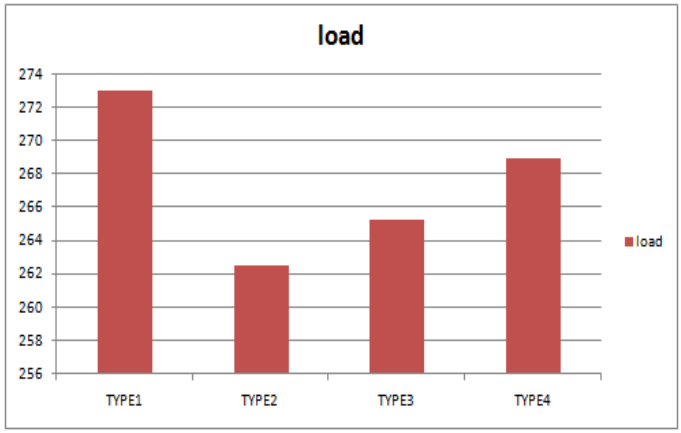
Comparison of ultimate load of this samples (14th day) - ultimate load values for sample (28th day)

SAMPLES	PERCENTAGE OF FINE AGGREGATE &BAGASSE ASH	ULTIMATE LOAD (KN)
TYPE 1	100&0	273.04
TYPE 2	90&10	262.58
TYPE 3	80&20	265.29
TYPE 4	70&30	269

Comparison of ultimate load of this samples (7th day) - ultimate load values for sample (14th day)

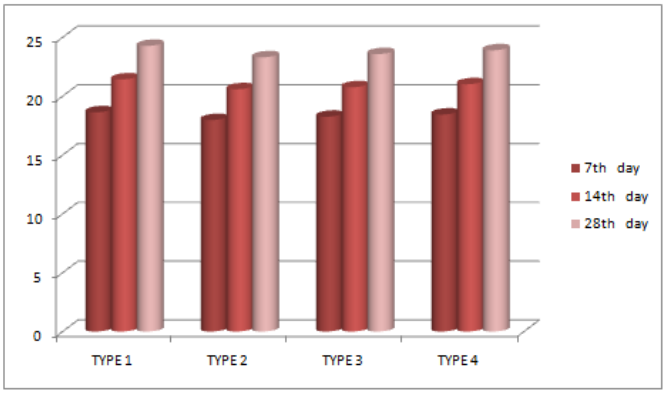
SAMPLES	PERCENTAGE OF FINE AGGREGATE &BAGASSE ASH	ULTIMATE LOAD (KN)
TYPE 1	100&0	241.23
TYPE 2	90&10	231.73
TYPE 3	80&20	233.63
TYPE 4	70&30	236.56





compressive strength value 0f the samples(28th day)

SAMPLES	PERCENTAGE OF FINE AGGREGATE &BAGASSE ASH	COMPRESSIVE STRENGTH (N\mm²)
TYPE 1	100&0	24.27
TYPE2	90&10	23.3
TYPE3	80&20	23.58
TYPE4	70&30	23.9



comparison of compressive strength 0f the samples

V. CONCLUSION

From the test results, the following conclusions are drawn. Minute compressive strength reduction is observed variably depending on the percentage use of aggregate and bagasse ash. Overall cost reduction of construction is observed with 30% replacement of fine aggregate and bagasse ash the strength attained reduces invariably from 10% - 15% as compared to the normal concrete. since minute non uniform variation is obtained in the strength of bagasse ash concrete .It can be effectively used for low strength concrete mixes.

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