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EXPERIMENTAL INVESTIGATION ON CEMENT BRICK WITH ADDITION OF QUARRY DUST AND FLY ASH

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Abstract: Waste management is one of the challenging problems in all along the world. Fly ash is generating in large quantities especially by thermal power plant. Quarry dust a waste from the stone crushing unit. These wastes can cause environmental pollution. The cost of cement increases day by day, their production and transportation is becoming more difficult. Therefore the use of alternative sources is becoming increasingly important. So utilizing this fly ash and quarry dust more wisely as a replacement for cement, so it will be cost effective and also a better way for managing its disposal. And also it has more environmental benefits, eco-friendly and also economical. In our experimental study deals with the implementation of Fly ash and quarry dust as an effective replacement for cement.

Keywords: Fly ash , quarry dust.

I. INTRODUCTION

As we know that now a days ,most development country facing shortage of post consumers disposal waste site and it's become very serious problem. For the reason regenerating and using waste product as prevent environmental pollution. Fly ash in finely divided resulting from the combustion of powered coal and collected by electronic precipitators in thermal power plants. Presently in India approximately 160million tons of fly ash is produced by thermal power plants every year. The estimate for generation of fly ash during the year 2031-2032 world be expected to be around 900 million tons. Industry produces solid waste in large amount and across large areas, which are expected to increase as the construction industry grows owing that overall production of quarry industry has been increasing rapidly in recent year's. It is a non-biodegradable waste that can be easily inhaled by humans and animals is also harmful to the environment. It is estimate that newly 175millions tons of quarry dust are produced every year and about 250-400 million tons of quarry dust is generated at site. The chemical and physical properties of various material are studied and the bricks are tested for compression , water absorption . All the properties of these bricks have been assessed in comparison IS12894:2002

II. MATERIAL USED

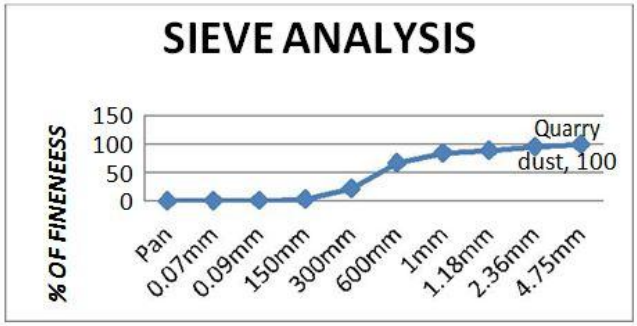
1. Fly ash
2.Quarry dust
3. Water
4. Weight balance
5. Brick mould

III. EXPERIMENTAL INVESTIGATION

3.1 GRAIN SIZE ANALYSIS

Sl. No	Sieve size in mm	Weight of Quarry dust retained (gm)	Percentage Weight Retained (%)	Cumulative Percentage Retained (%)	Percentage of Finer (%)
1	4.75mm	0.011	1.1	1.3	100
2	2.36mm	0.026	2.6	4.0	96
3	1.18mm	0.072	7.2	10.9	89.1
4	1mm	0.042	4	15.1	84.9
5	0.600mm	0.185	18.7	33.2	66.8
6	0.300mm	0.455	44.2	78.8	21.9
7	0.150mm	0.197	19.5	97.3	2.7
8	0.09mm	0.017	1.7	99.0	1.0
9	0.070mm	0.04	0.2	99.4	0.6
10	pan	0.006	0.8	100	0

Result: Fineness modulus = 5.182



Grain size Analysis Graph for sample-1

3.2 SPECIFIC GRAVITY

SPECIFIC GRAVITY FOR CEMENT
SPECIFIC GRAVITY
(M3-M1)/(M2-M1)-(M4-M3)
(1890-645)/(875-645)-(1676-1890) =3.01
SPECIFIC GRAVITY FOR QUARRY DUST = (1710-645)/(845-645)-(1450-1710) =2.73
SPECIFIC GRAVITY FOR FLY ASH =(1.71-0.65)/(1.02-0.65)-(1.51-1.71)-24.4

IV. DESIGN OF BRIKS

4.1Mix Design

Total weight of mould = 7 kg
S1 = Cement/100 x Total weight of mould volume
70/100 x 7
4.9 kg
S1 =Fly ash x 7 /100
20/100x 7

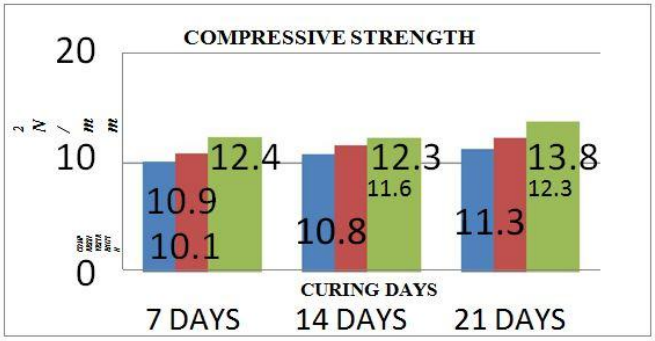
1.4 kg
S1 = Quarry dust/ 100x 7
10/ 100 x 7
0.7 kg

4.2 Mix proportions

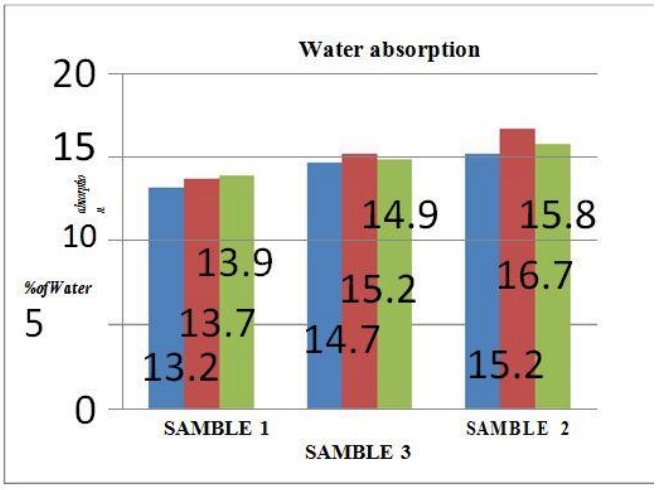
sample	Cement%	Fly ash%	Quarry dust%	Total%
S_0	50	40	10	100
S_1	60	30	10	100
S_2	70	20	10	100

4.3 COMPRESSIVE STRENGTH TEST ON BRICK:

BRICK SAMPLES	7 DAYS N/mm^2	14DAYS N/mm^2	21 DAYS N/mm^2
1	10.1	10.8	11.2
2	10.9	11.6	12.3
3	12.7	13.1	13.5



4.4 WATER ABSOPTION TEST ON BRICKS
Water absorption, percent by mass, after 24-hour immersion in cold water is given by the following formula: Water absorption =M2-M1/M1 X 100 =3.60-3.10/3.10 X100
Water absorption =16.2%

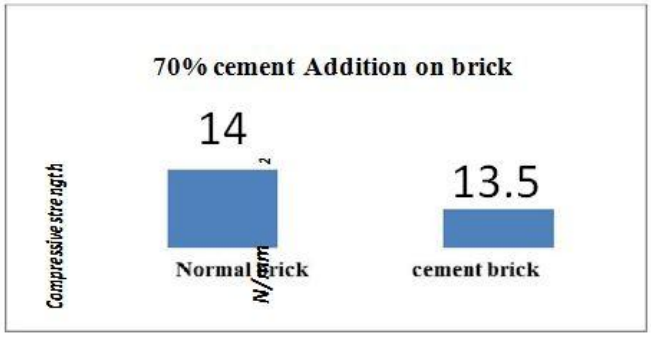


4.5 SOUNDNESS
The bricks were tested for soundness in weight batching by striking with each other. The bricks gave a clear ringing sound up to 20% replacement in weight batching.
4.6 HARDNESS
No nail impression was made on bricks when scratched up to replacement of 20% sawdust.
It provided to sufficiently hard.

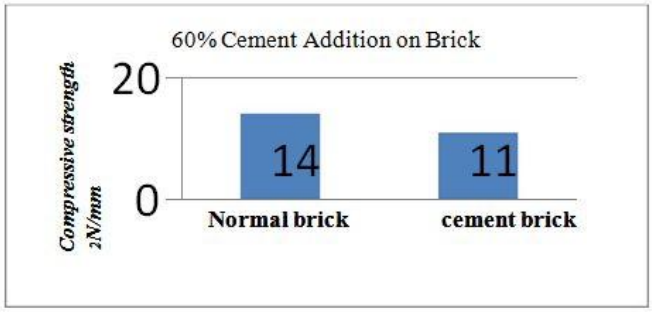
4.7 DROP TEST
The bricks were dropped flat from a height of 1M on a hard ground. The bricks compared with those of first class bricks.

V. COMPARE WITH OTHER BRICKS

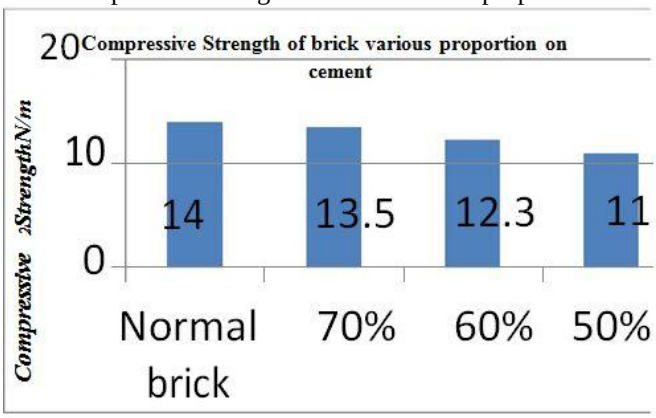
5.1 Compressive Strength 70% of cement addition on cement bricks



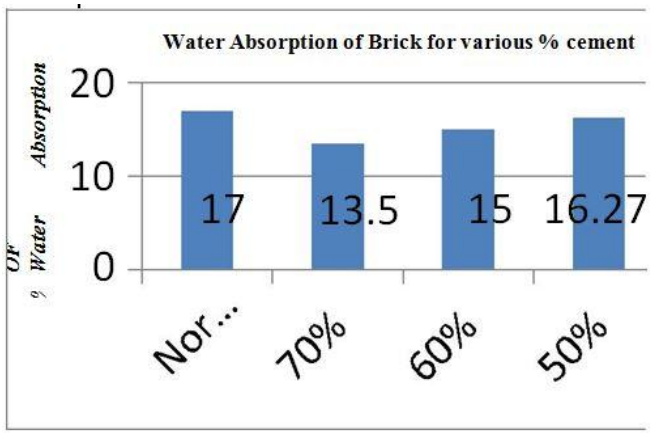
Cement brick addition of 60% cement



Compressive strength brick for various proportion



5.2 WATER ABSORPTION:



CONCLUSION

Cement can be replaced with quarry dust up to 25% without much loss in compressive strength

From the result a marginal decrease in compressive strength is observed up to 25% cement replaced with quarry dust

Considerable decrease in compressive strength was observed from 25% cement replaced with quarry dust.

From 20% to 25% cement replaced with quarry dust 7 days compressive strength is slightly increased.

Cement bricks were found to be sufficiently hard as scratching by the finger nail on the surface left no impression on it as compared to normal bricks

A ringing sound in the cement bricks was observed to be far better than in normal bricks.

The average absorbed moisture content of normal bricks is found to be 17% and for cement brick are found 13.2%.thus there is net 20%decrease in moisture absorbed for cement brick as a part to normal bricks.

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