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The Study of Parameters of Concrete using Waste Material

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Abstract: ***This project represents the experimental results of replacement of coarse aggregate with that of waste cuddapah stones and evaluates the effect of various properties of concrete. The basic objective of the study is to identify an alternative source of fine aggregate because the natural sources of aggregates are depleting very fast due to the fast pace of construction activities in India. In this study concrete of M30 grade were considered with a W/C ratio of 0.45 for the replacement of 0%, 5%, 10%, 15%, 20% and25% of course aggregate by Waste cuddapah stones. In this investigation the improvement in compressive strength and durability properties. Based on the overall observations, it could be recommended that the Waste cuddapah stones could be utilized as coarse aggregate in the various applications of concrete. This study investigates the performance of concrete mixtures containing Waste cuddapah stones at various percentage and compressive strength, at 7 and 28 days. Result shows that concrete with Waste cuddapah stones had higher compressive strength and flexural strength.***
Key words: ***Waste cuddapah stones, Compressive strength, flexural strength.***

I. INTRODUCTION

Concrete is a very important material and widely used in construction industry. It offers stability and design flexibility for the residential marketplace and environmental advantages through every stage of the construction and use the characteristic compressive strength is usually measured by 150 mm x 150 mm cubes according to BS approach. Concrete is a construction material which is a mixture of cement (commonly Portland cement) as well as other cementation material such as fly ash and slag cement, aggregate water and chemical add mixtures are widely used in construction industry. Now days there are many filler material used in construction industries. In cement based products such as concrete and mortars, a balance between the particle sizes of component must be kept in order to obtain the required material properties such as workability, strength and durability of concrete. The worldwide consumption of stones as coarse aggregate (CA) in concrete production is very high, and several developing countries have encountered some strain in the supply of natural Aggregate in order to meet the increasing needs of infrastructural development in recent years . So, there is large demand for alternative materials for coarse aggregates in construction industry. To overcome the stress and demand for natural aggregate, researchers have identified some alternatives for sand, namely scale and steel chips , waste iron, crushed granite fine , etc. Environmental management in developing countries is a complex issue because environmental problems are linked with social and economic aspects, which must be considered in the development of any environmental program or regulation .The problem of waste accumulation exists worldwide, specifically in the densely populated areas. Scale, granulated slag, and steel chips are industrial wastes in the iron and steel industry and cause a nuisance both to the health and environment when not properly disposed. Reuse of industrial solid waste as a partial replacement of aggregate in construction activities not only saves landfill space but also reduces the demand for extraction of natural raw materials.

II. MATERIALS

The Materials used for this experimental work are cement, sand, water, coarse aggregate, waste cuddapah stones.

A. Sand

The fine aggregate used for all the specimens were Narmada River sand com plying the requirements of IS383:1970. The specific gravity of the fine aggregate is 2.74. The fractions from 4.75mm to 150 micron are termed as fine aggregate.

B. Water

Portable water was used for experimentation.

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C. Cement

Ordinary Portland cement of 43 grade. It was used in this experimentation confirming to IS-12269-1987.

D. Coarse Aggregate

Crushed granite coarse aggregates of 20-mm maximum size were used.

E. Waste Cuddapah Stones

The Waste cuddapah stones were obtained from local construction industries, and they are used to replace coarse aggregate partially in the production of concrete. The nature and the physical structure of the Waste cuddapah stones used for the investigation. The physical and chemical characteristics of the Cuddapha stoneswere determined in the laboratory as per standard methods.

Waste cuddapah stones

TABLE 1
Typical Composition Of Ordinary Portland Cement

Chemical	Weight
Tri- calcium silicate-C3S	55%
Di -calcium silicate-C2S	18%
Tri- calcium-aluminate-C3A	10%
Tetra- calcium alumino ferrite –C4AF	8%
Calcium sulphate dehydrate-CSH2	6%

III. EXPERINMENTAL WORK

The research is completely based on IS-456-2000. The three set of mixture Mix A, Mix B & Mix C was prepared by using M-30 grade and the proportions are 1:1.87:3.32 The Waste cuddapah stones is used to replacement of aggregates of saving natural resources. The tests are conducted on prepared concrete cube that is compression strength test.

FOR Mix A1

0% of Cuddapah stones and 100 % coarse aggregates by weight.

FOR Mix A2

5% of Cuddapah stones and 95 % coarse aggregates by weight.

FOR Mix A3

10% of Cuddapah stones and 90% coarse aggregates by weight.

FOR Mix A4

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15% of Cuddapah stones and 85% of coarse aggregates by weight.
FOR Mix A5
20% of Cuddapah stones and 80% of coarse aggregates by weight
FOR Mix A6
25% of Cuddapah stones and 75% of coarse aggregates by weight
Afterwards the fresh mixes were filled into steel moulds with internal dimension of 150X150X150 mm. Steel mould was filled with material to about half height and the layer was compacted by tamping it with tamping rod in a uniform manner over mortar surface in such a way to produce full compaction of the mortar with neither segregation nor excessive laitance. The moulds were then be completely filled and the upper layer of the mortar compacted in a similar manner, after which the mould were kept on the vibrating table.
Compression strength = Ultimate load / b Bearing area
Finally the relation between carbonation depth and compressive strength is found out. The specimen was tested an interval 7 and 28 days. The test is made three types of test specimen of M-25 grade of concrete.

A. Testing Method
1) Compression Strength
2) Flexural strength

IV. RESULT AND DISCUSSION

1) In this study, Cuddapha stones have been used as a partial replacement of coarse aggregate. The ordinary Portland cement, sand and aggregate mixing proportion is 1: 2.1:2.95. Fig 1 and 2 shows the result of the compressive strength depending upon the changes in the mixing percentage of the Cuddapha stones. The test result shows that Mix-A1, A2, A3 having incremental increase in the strength while A4 shows the slight decrement in strength although it is still better than the strength of normal concrete and Mix A5 shows reduction in strength . The compressive strength of mix A1, A2, A3and A4 increased by 3.40%, 5.08%, 10.01%, 8.83% With respect to normal Mix A for 28 days respectively and strength of A5 decreased by 1.75% As per the result obtained we can say that the Mix A3 is optimum Mix and since Mix A4 is at par with Mix A3 can use as the economical mix.

2) As per the fig.3 and 4 shows the result of the flexural strength and the value of flexural strength in line with compressive strength .the flexural strength of mix A1, A2, A3and A4 increased by 1.62%,2.54%,4.86%,4.39% With respect to the normal Mix A for 28 days respectively and strength of A5 decreased by 0.23%.

Table-2
Test Results of Compressive Strength Depending Upon Various Percentages of Mixing Cuddapah stones.

S,no	% Cuddapah Stone	Strength 7 days N/mm2.	Strength 14 days N/mm2	Strength 28 days N/mm2
1	0	24.46	34.26	38.16
2	5	24.13	33.81	39.45
3	10	24.86	35.07	40.1
4	15	26.15	39.18	41.97
5	20	25.12	38.73	41.52
6	25	24.9	34.25	38.05

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Fig1. Relation between compressive strength of M30 concrete at various percentages of Cuddapha stones.

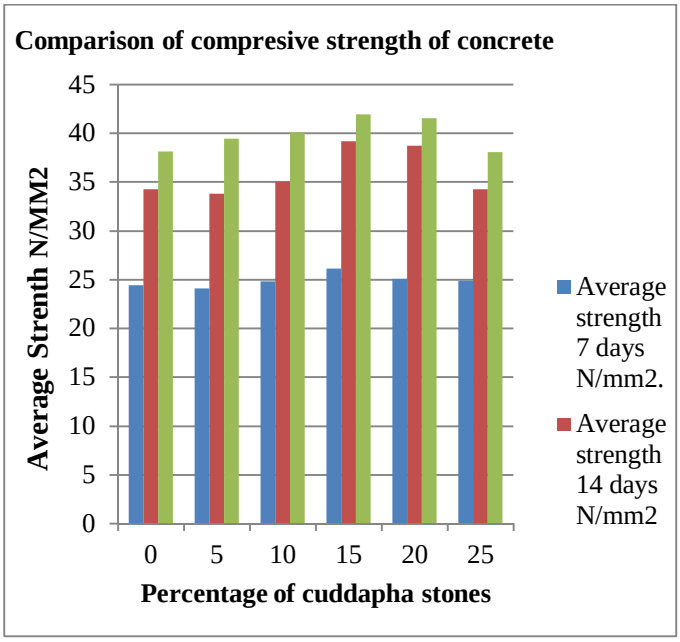

Fig2. Relation between compressive strength of M30 concrete at various percentages of Cuddapha stones.

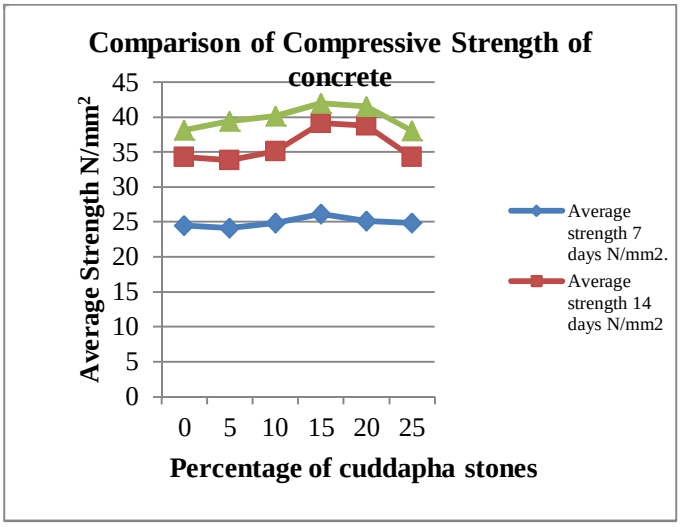

Table-3
Test Results of flexural Strength Depending Upon Various Percentages of Mixing Cuddapha stones.

S.No.	% CUDDPA Stone	Average strength 7 days N/mm^2.	Average strength 28 days N/mm^2
1	0	3.6	4.32
2	10	3.5	4.39
3	15	3.65	4.43
4	20	3.8	4.53
5	25	3.75	4.51

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Fig3. Relation between flexural strength of M30 concrete at various percentages of Cuddapha stones.

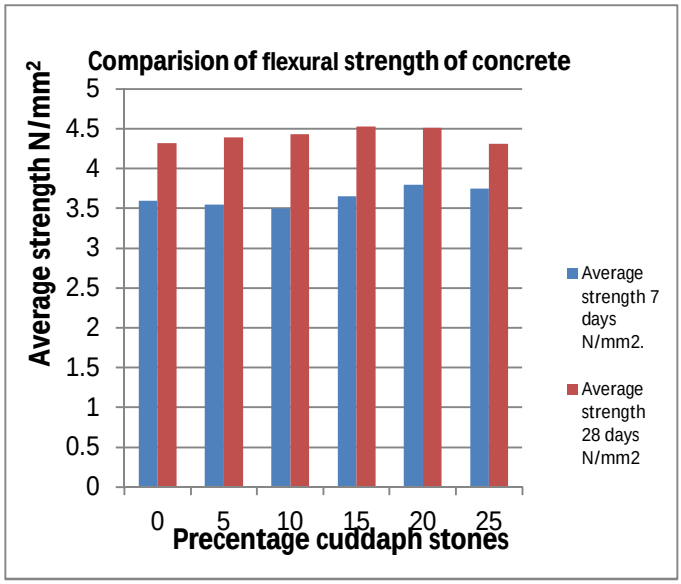
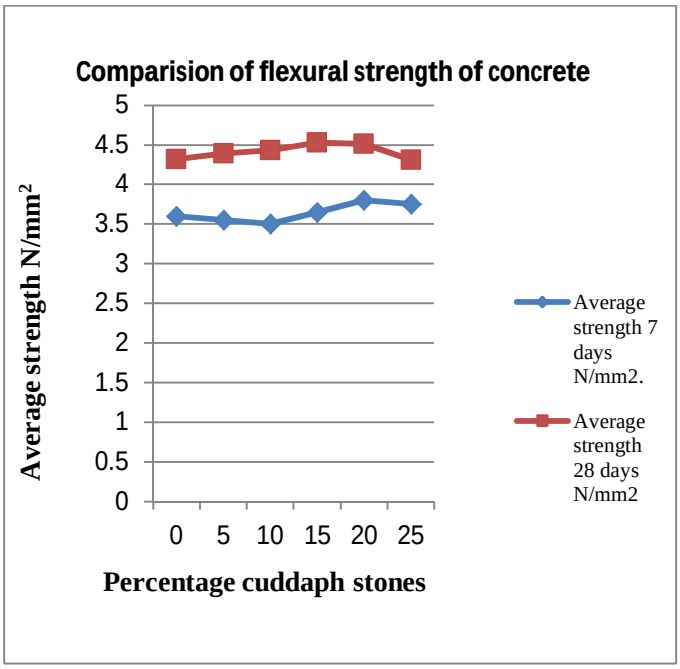


Fig4. Relation between compressive strength of M30 concrete at various percentages of Cuddapha stones.



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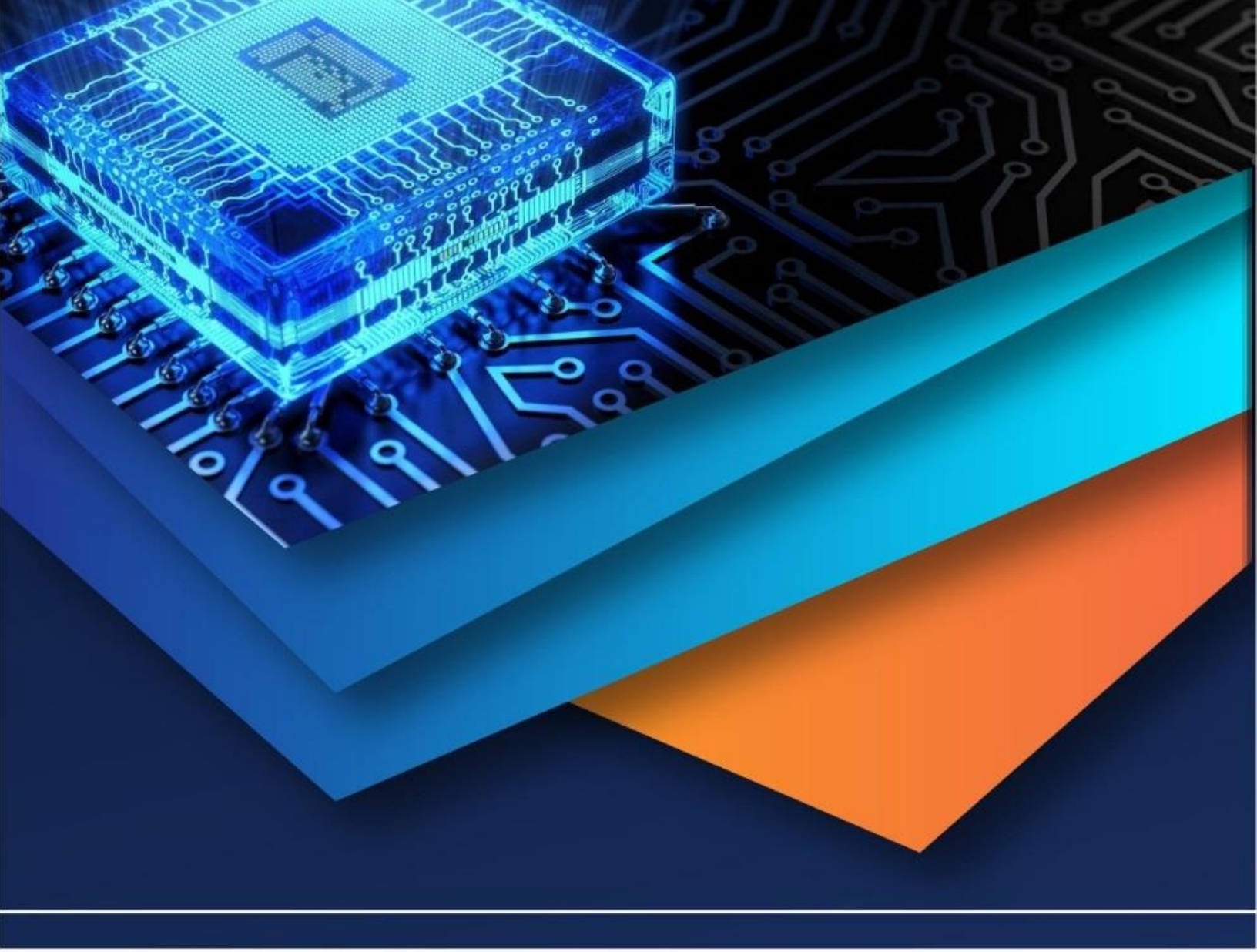

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