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Experimental study on effect of partial replacement of marble dust on concrete M30 with the addition of coconut coir

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Abstract:- *Concrete is a construction material to cover reinforcement of element. They made from the inert mineral material, cement content, water, and admixtures. The aim of this investigation to find those constituent materials to replace it the ingredient of concrete by partially. So, we take the waste material from our industry like marble dust and coconut coir. And determine the strength of concrete by partially replace of cement with marble dust and addition of coconut coir with different variation of percentage.*

Keywords*: Compressive strength, Workability, Coir Fiber, Marble dust (powder).*

I. Introduction

Nowadays, In India concrete structure are built with very costly, because of the cost of material, resources, and transportation, that's why we use the waste content of marble and wastage coconut coir fiber. Concrete is a composite mass, which makes ingredient of concrete. Ingredients of concrete are aggregate, sand, water and chemical admixture or other etc. in this experimental investigation, We Design M: 30 for infrastructures according to Indian standards codes. Before the of design of concrete, we studied deep and follow all the parameter, guideline's and aspects, formula's and so much from bureau of Indian standards. We conduct required tests for design M30, In this experiment, we take 20mm aggregate, fine sand, 10mm aggregate, fresh water, marble dust (powder) and coconut coir fiber. We design four trial mix samples M30 in different variation. See table1,

Trial Mix	% of cement	% of coconut coir	% marble dust
sample 1	100	0%	0%
sample 2	95	1% from wt. of cement	5% from wt. of cement
sample 3	90	2% from wt. of cement	10% from wt. of cement
sample 4	85	3% from wt. of cement	15% from wt. of cement

II. Literature Review

[1]Saravana Raja Mohan - experimental probe to study the effects of replacement of cement (by weight) with several percent's of fly ash and the effects of addition of processed organic coconut fiber on comp. Strength, split tensile force, flexure intensity, and modulus of elasticity was taken up. A regulate blend of ratios (1:1.49:2.79) with w/c of 0.45 was created for the normally popular M20 concrete. Cement was changed with five parts (10 to 30%) of fine fly ash. Four parts of coconut fibers (0.15% to 0.60%) consuming and 40 mm distance were used. Test outcomes show that the renewal of 43 grades ordinary Portland cement with fly powder showed a rise in compressive strength split tensile intensity, flexure intensity and modulus of elasticity for the preferred blend ratio. Totaling of coconut fibers resultant in fly residue blended concrete composite –FMCC did improve the mechanical properties of FMCC and at the same time increased the strength levels reflected by enlarged collapse strain, production the matter fit for seismic provisions.

[2] Rajan Shikha, Saxena A.K- This investigation states the behavioral search of coconut fiber in the concrete structure. Totaling of coconut fiber in concrete it develops several engineering properties of concrete. Since it possesses good to tie up properties in concrete. Coir fiber is treated as organic latex when previously using in concrete. So that it not affected by wetness in concrete Addition of coconut fiber increases compressive strength flexure strength and tensile intensity of concrete. The research establishes the optimum fiber content to be 1% 2% 3% (by weight of cement). 27 cube ware cast of Trial Mix 25 and Trial Mix 30 Grade concrete the comp. strength of cured concrete estimated of 7, 14, 28 days. This outcomes show coconut coir concert can be used in construction and coconut fiber is enhanced controlling of west fiber and it is also eco fondly.

[3]Sanjay sen and Rajveev -This creation presents the results of laboratory test taken out consuming coconut fiber ash, since a partially replaced for cement in concrete production. Concrete cubes are cast and examined at curing old of 7.0, 28.0, 60.0, & 90.0 days using 00, 5.0, 10.00, 15.00, 20.00, & 25 percentages replacement flattening out. Slump cone test results show that the workability of the concrete reduced as thec fasatisfies improved & the compressive force of cfa concrete enlarged with curing old but reduction with increasing the percentages of coconut fiber ash. The percentage strength gained at 90 days for 5% and 10% for the control of 0% is 96.220% & 86.120% separately. The ideal compressive strength of 59.250 n/mm^2 was obtained at 5% replacement at 90 days of old. The percentages strength at this best point of the control is 96.220%.

[4]Bhupendra Kumar (2015) - Discusses the comparative study between Fly ash based coconut fiber concrete with simple cement concrete of M40 grade. This research paper offers use of the agricultural and commercial waste material into concrete, which more advantageous the homes of concrete and makes environment eco friendly. The fly ash is changed with the cement as 10, 20, and 30% and coconut fibers are delivered moreover by weight of cement inside the proportions of 0, 1, 1.5, 2 2.5, 3%. The diameter of coconut fiber is varies among 0.25 to 1.0 cm and period is taken 4 cm. The results shows increment in compressive power of concrete by adding fly ash and coconut fiber collectively into concrete. Separately adding of coconut fiber and fly ash does now not show great outcomes.

III. Methodology

A concrete mix has been designed to achieve the minimum fck of M30 as required by Indian standard codes 456 – 2000, 10262-2009, 516-1959, 383-1970, 2386, 9103-1999, 3025. The investigation was done by taking 1% 2% and 3% (by the weight of cement) of coconut fiber in the concrete mix. Coconut fibers were obtained from local market. In the method, the water-cement ratio is selected for the target strength from empirical relation's and the water content is chosen for the required workability for the aggregate in a saturated surface dry condition. In the Indian method and IS guideline, the vol. of dry rodded coarse aggregate in the concrete mix is determine 1st depending on the maximum size of aggregates and the particle distribution of fine aggregates. The following tests were conducted on the respective specimens- material test, compressive strength on cubes. Preliminary tests, the tests conducting in the lab on trial mix of concrete to verify its strength is termed preliminary tests. The test helps in determine the adjustment require in mix design to obtain stipulated performance of concrete. We determine the strength of concrete cubes for 7 days, 14 days, 28 days and conduct numbers of compressive test for strength. We also conclude the workability of trial mix design by slump test.

The minimum compressive strength required from structural considerations which in turn is governed by w/c ratio is the basic requirement. The suggest compressive strength required at a unique age , commonly 28 days, determines the nominal water- cement ration of mix. Thus the goal of the mix layout ought to continually be to get concrete combinations of gold standard electricity at minimal cement content and acceptable workability. The degree of workability required depends on three elements. These are the size of the phase to be concreted. The favored workability relies upon at the compacting gadget to be had. Slump is a measure indicating the consistency or workability of clean cement concrete. This test can also be used to decide the water content material to give targeted droop fee. In this check, sparkling concrete is filled into a mildew of precise shape and dimensions, and the supporting mildew is eliminated. The unsupported fresh concrete cone flows to the sides resulting in a sinking in its height. We conduct the compressive strength test on more than 36 cubes specimen.

Fig-1, CTM with cube specimen

fig-2, crushed cube specimen

Fig. 3 slump test

IV. Materials (Ingredients of Concrete)

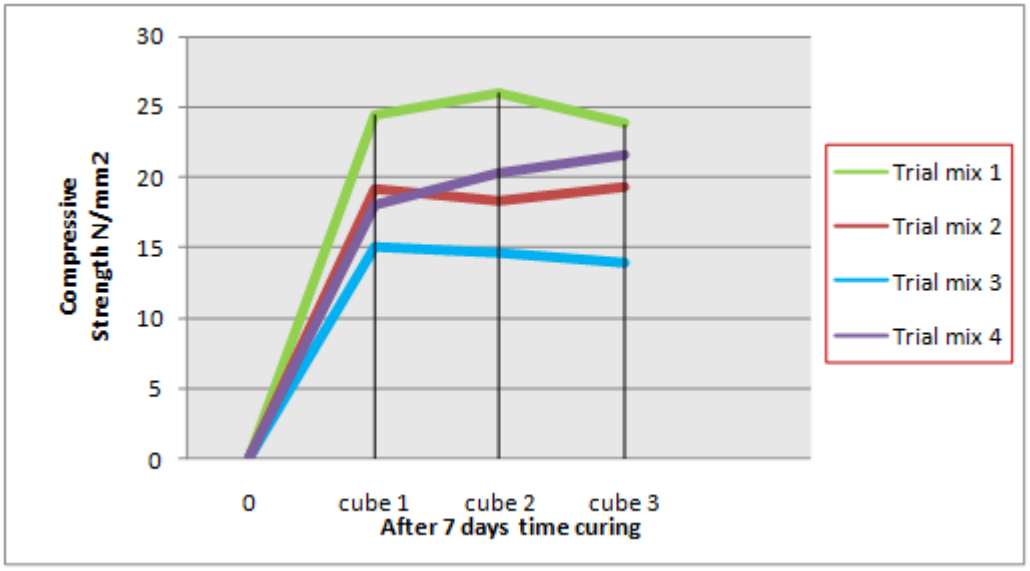
(1)Ordinary Portland cement 43 grade –conforming IS 8112, (2) Coarse aggregate 20 mm from Gwalior India quarry – conforming IS 383-1970, (3) Fine aggregate 10 mm from Gwalior India quarry- conforming IS 383-1970,(4) Sand conforming IS 383-1970,(5) fresh water IS 3025, (6) Marble dust passed from 90 micron sieves,

Fig.4, coconut coir fiber and marble dust (powder)

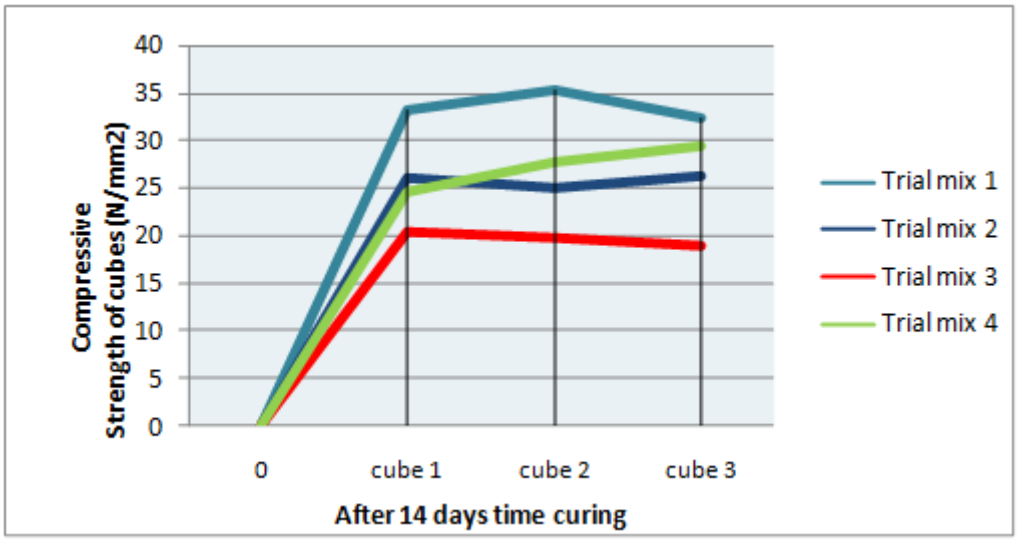
V. Results and discussion

Table 2 Average results of compressive strength.

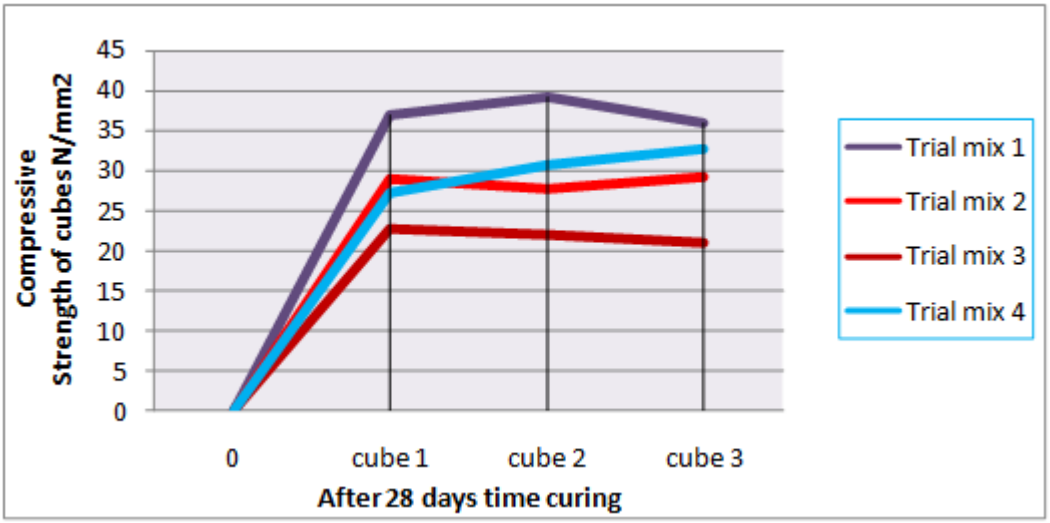
Design M 30	% of OPC 43 Grade	% of Coconut coir Fiber	% of Marble dust powder	Average Comp. Strength of cubes For 7days (N/mm2)	Average Comp. strength of cubes For 14days (N/mm2)	Average Comp. strength of cubes For 28days (N/mm2)
Trial Mix 1	95%	1%	5%	24.67	33.65	37.40
Trial Mix 2	90%	2%	10%	18.83	25.69	28.55
Trial Mix 3	85%	3%	15%	14.48	19.75	21.95
Trial Mix 4	100%	0%	0%	19.98	27.25	30.29



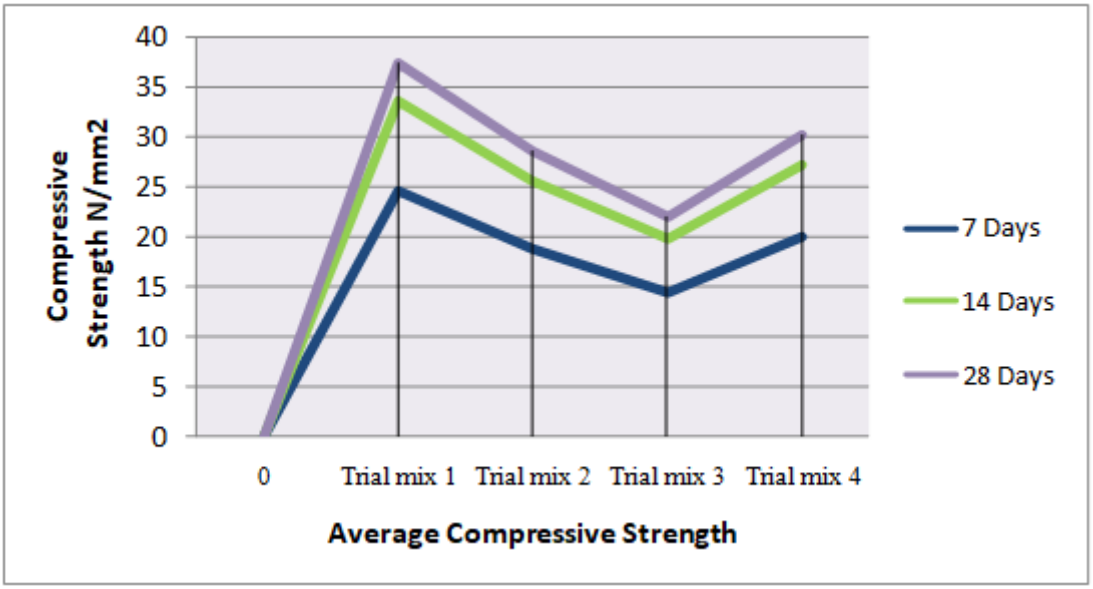
Fig,-5 compressive test for 7 days strength.



Fig,-6 compressive test for 14 days strength.



Fig,-7 compressive test for 28 day strength.



Fig,8- shows the average compressive strength.

Table-3 shows the workability of the concrete by the slump test.

S. no.	Slump value	Trial mix 1	Trial mix 2	Trial mix 3	Trial mix 4
1	Slump value1 (Batch 1) mm	25	10	5	45
2	Slump value2 (Batch 2) mm	30	5	0	40
3	Slump value3 (Batch 3) mm	25	5	0	50

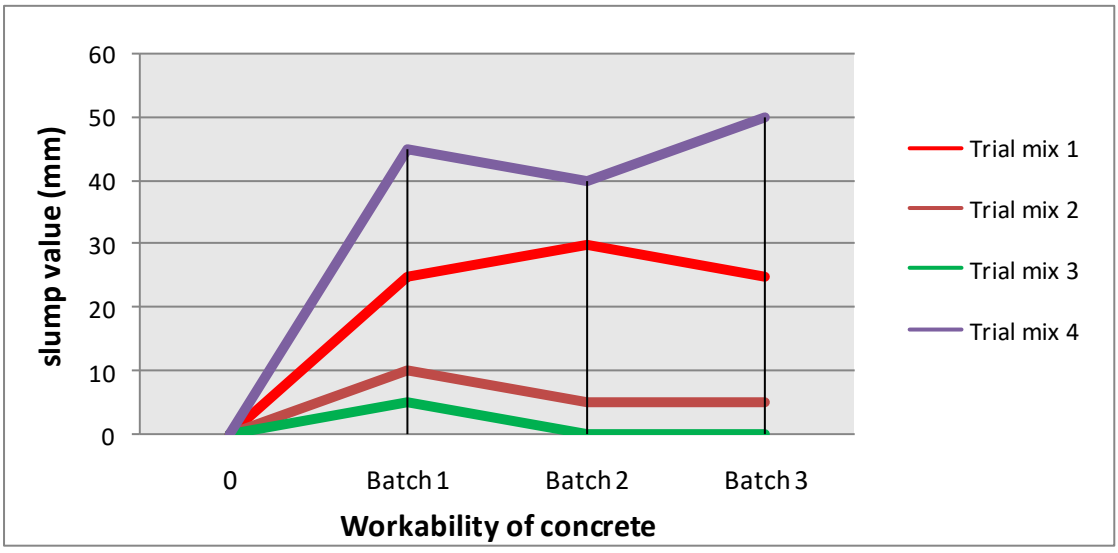


Fig-9, shows the slump value of trial mix

VI. Conclusion

i. An outcome of investigation is close to the target strength of the concrete is 38.25 N/mm^2 and archives the characteristic strength of design M30.

ii. This experiment computes the workability of concrete. We found low degree of workability in the concrete from IS 456: 2000.

iii. Trial mix 1, archive the characteristic strength of concrete and target strength of M30 and have low degree of workability. These types of concrete are used for highway engineering**.

iv. The mass of coir fiber increases, they decrease the strength of concrete because they effect on concrete properties.

VII. References

1. Prabhat K. Bhargava, Managing Director of Bhargava building Atelier (p) ltd, Gwalior mp India - (estd. Since 1982) nabl accredation lab.

2. B. Krishna Rao - (2016), “Study on Marble Powder as Partial Replacement of Cement in Normal Compacting Concrete” IOSR Journal of Mechanical and Civil Engineering, Volume 13, pp. 01-05.

3. Jashandeep singh, Er. R S Bansal (2015), “Partial Replacement of Cement with Waste Marble Powder With M25 Grade” International Journal of Technical Research and Applications, Volume 3, pp. 202-205.

4. Sonu Pal, Amit Singh, Tarkeshwar Pramanik, Santosh Kumar, Prof. N. Kisku - (2016), , “Effects of Partial Replacement of Cement with Marble Dust Powder on Properties of Concrete” International Journal for Innovative Research in Science & Technology, Volume 3, pp. 41-45.

5. Aalok D. Sakalkale, G. D. Dhawale, R. S. Kedar - (2014), "Experimental Study on Use of Waste Marble Dust in Concrete", International Journal of Engineering Research and Applications, Vol. 4, Issue 10, Part - 6, pp. 44-50.

6. P.A. Shirule, Ataur Rahman , Rakesh D. Gupta (2012), "Partial Replacement Of Cement With Marble Dust Powder", International Journal of Advanced Engineering Research and Studies, Vol. 1, Issue 3 , pp. 175-177 .

7. Ruchi Chandrakar, Avinash Singh -(2017), "Cement Replacement in concrete with Marble Dust Powder", International Research Journal of Engineering and Technology, Volume: 04 Issue: 05, pp. 1409-1411.

8. Anju Mary Ealias, Rajeena A P, Sivadutt S-(2014), "Improvement of Strength of Concrete with Partial Replacement Of Course Aggregate With Coconut Shell and Coir Fibres“ ,IOSR Journal of Mechanical and Civil Engineering, Vol. 11, Issue3 Ver.2, PP16-24.

9. Athul Krishna K R -(2017), "Optimum Replacement Of Marble Chips And Marble Dust As Aggregates In M20 Concrete", International Journal For Technological Research In Engineering, Volume 4, Issue 6, pp. 947-952.

10. Bhupendra Kumar and S S Kuswah -(2015), "Effect of Coconut Fiber and Fly Ash on Concrete", International Journal of Science Technology & Engineering, Volume 2, Issue 3, pp. 127-133.

11. Rajan Shikha, Saxena A.K., Jha A.K. (2015), “Evaluation of Compressive Strength of Concrete Using Coconut Coir Fibre", International Journal for Research in Applied Science & Engineering Technology,(Volume 3 Issue IX), pp. 313-317.

12. A. Talah, F. Kharchi, R.Chaid - (2015),"Influence of Marble Powder on High Performance Concrete Behavior", Elsevier, pp. 685-690.

13. Omar M.Omar, GhadaD. AbdElhameed, Mohamed A.Sherif (2012), "Influence of limestone waste as partial replacement material for sand and marble powder in concrete properties", HBRC Journal,pp. 193-203.

14. Rizwan Qadir, Fahad Perviaz,” Effects of Coconut Fiber and Marble waste on properties of Concrete” International Journal of Scientific & Engineering Research, Volume 7, Issue 7, July-2016.

15. Jaspal Singh Manmeet Kaur Manpreet Kaur 2015 - “Sustainable concrete using natural fibre a review” Journal of international academic research for multidisciplinary ,volume 3, issue 9.

16. Shreeshail. B.H-"Effects of coconut fibers on the properties of concrete" International Journal of Research in Engineering and Technology.

17. Rajeev Banerjee-"Use of glass and coconut fibres in enhancing properties of concrete" International Journal of Engineering Trends and Technology.

18. Rajan Shikha and Saxena A.K 2015 -International Journal for Research in Applied Science & Engineering Technology : All Rights are Reserved 313"Evaluation of compressive strength of concrete using coconut coir fibre".

19. Saravana Raja Mohan, A. Rajaraman 2012 - American J. of Engineering and Applied Sciences, "Properties of Fly Ash Based Coconut Fiber Composite" pp- 29-34.

20. Sanjay Sen and Rajeev Chandak- 2015 "Effect of coconut fibre ash on strength properties of concrete" Int. Journal of Engineering Research and Applications Vol. 5, Issue 4, (Part -1), pp.33-35

21. Indian standard codes-IS 456–2000, IS-10262-2009, IS-516-1959, IS-383-1970, IS-2386, IS-9103-1999, IS-3025.

