Alternative Low Cost Building Materials {Coconut Shells and Fly-ASH}

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Abstract- **In this project we will discuss about the replacing of coarse aggregate and cement by coconut shells and fly ash In this project we know that the strength of both coarse aggregate and cement mix now we will check the concrete and then we add coconut shells and fly ash 15% and we prepare the concrete We will use this mixture in making of cubes, columns, beams we will check the concrete strength for 7days, 14 days, 28days then we use it in preparation of concrete blocks and etc By using these elements we get the similar results and the cost will also reduce the detail report will be discussed in next pages.**

Index Terms- Short Term Load forecasting, ANFIS.

I. INTRODUCTION

Concrete is the extensively used number one basic material on the planet today. The enthusiasm to create the light weight material has been the subject of study that has tested researchers and specialists alike. The test in making a lightweight concrete is diminishing the density while keeping up quality and without unfavorably impacting cost. Bringing new aggregates in with the general mish-mash outline is a typical approach to bring down a concrete thickness. Ordinary mix contains four parts, binder, smashed stone, sand and water. The pulverized stone and sand are the parts that are for the most part supplanted with lightweight aggregates. Lightweight concrete is generally made by joining characteristic or manufactured lightweight aggregate. A portion of the lightweight aggregate utilized for light weight concrete creations Concrete is a manufactured composite, comprises of fixings, for example, cement and water. Today, because of headway of foundation in both creating and created nations, the usage of cement has been extending at a higher rate. The cost of development material is expanding orderly on account of popularity and lack of crude materials. Growing interest of concrete causes exhaustion of aggregate stores, ecological corruption and natural lop-sidedness. In perspective of this test, analysts all through the world have been examining method for supplanting aggregate to make development supportable and temperate. Distinctive analysts have inspected the use of coconut shell and their backup in auxiliary building improvement. Coconut shell is a copiously accessible agricultural waste from neighbourhood coconut business ventures, so its transfer is a major issue for nearby environment. In this way, these squanders can be utilized as substitution material as a part of the development business. This will decrease the cost of development materials and take care of the issue of transfer of squanders. The effect resistance, dampness holding and water engrossing limit of coconut shells are more contrasted with ordinary aggregate. Thickness of coconut shells are inside as far as possible for lightweight aggregate, advance increasingly the strength properties of coconut shell aggregate are similar to other conventional lightweight concrete, so light weight concrete can be set by using coconut shell as coarse aggregate. These optional lightweight materials are grasped for non load bearing dividers and non basic floors in building. On the off chance that basic Light Weight Concrete can be created from coconut shells, which is locally open in wealth, it would be an advancement accomplishment for the nearby development undertakings. Therefore, the fundamental target of this exploration is to choose the likelihood of utilizing strong waste coconut shells as coarse aggregate for auxiliary Light weight concrete. To study the properties of coconut shells, similarity of coconut shells with cement and to create coconut

shell aggregate concrete with 28 day compressive quality more than 20 N/mm2.

1. To study the quality properties of cement in substitution of coarse aggregate.
2. To study the quality properties of cement in substitution of coarse aggregate and supplanting of fly ash with concrete.
3. To study the concept of compressive and split tensile strengths.
4. To find efficient solution for high cost development material.
5. To plan lightweight concrete by utilizing coconut shell as course aggregate.

SCOPE OF THE WORK

The point of this study is to study the utility and profitability of coconut shells as a coarse aggregate as a contrasting option to characteristic aggregate in cement.

(1) This trail work was held to acquire the quality of halfway supplanting of concrete with fly ash and smashed stone with coconut shells.
(2) In this test two sources of substitution materials are utilized i.e.; coconut shell and fly ash.
(3) The test is led for long term curing to know quality changes.
(4) Test like compressive quality, split elasticity and flexural quality are directed by varying the (%gee) of fly ash and coconut shell.

II. LITERATURER SURVEY

Recent works done in partial replacement of cement with fly ash and crushed gravel is replaced with coconut shell separately.

1.Vitas p. kulkarni and sanjay kumar (international journal of engineering and innovative technology) june2013 [2]

In this they concentrated on that aggregates gives volume with ease, including 66% to 78% of concrete. Customary coarse aggregate in particular rock and fine aggregate is sand in cement will be utilized as control. Whereas, normal material is coconut shell as coarse aggregate will be examine to supplant the aggregate in concrete. In this study three distinctive cement blends with various the mix of regular material substance in particular 10% ,20%, 30%. Three example orchestrated every cement blends.

2. Amarnath Yerramalaa (international journal of engineering inventions) October2012 [4]

Examined the quality of coconut shell substitution and unmistakable study the vehicle properties with coconut shells as coarse aggregate substitution. They presumed that, by expansion in coconut shell rate, diminished the density of concrete and with C.S% expanded the 7 days quality pick up additionally expanded with comparing 28 days curing quality.

3. Sreenivasulu dandagala,Praveen k ,anil kumar P (nationwide consultation of green production and technology for sustainable outlook) 2014

Compared the normal concrete with coconut shell. Coconut shell can be used as full substitution of smashed grainite or ordinary aggregate in cement development. It was watched that coconut shell concrete indicating 65% of compressive quality to that of ordinary concrete. There is not required to test the CS previous to use an aggregate except for water assimilation. Coconut shell exhibit more confrontation beside crushing.

4. Manider kaur,manpreet kaur (international journal of applied engineering research) 2012

This is a evaluation on consumption of C.S. as course aggregate in mass cement Compressive quality of the cement declines as the rate of the C.S. increments in the two blend propottions. For a situation, concrete got from CCS displayed a higher compressive quality than palm kernel shell. Comes about likewise showed that 30 to 40 % cost diminishment for concrete created from C.S. what's more, palm kernal shell individually. (coconut shell is more reasonable) when utilized as substitute for ordinary aggregate in concrete generation.

5. Cordilia Marboh , amritha agnihotri rahul kumar satbhaiya (int Ernational journal of engineering ,management and medical research) june-2015

This paper mainly consists of conduct of R.C beams with coconut shell as coarse aggregates In this study they contemplated that the density and strength attributes of concrete delivered by volume substitution of 20,30,40,50 and 100% supplanting of pounded rock with coconut shells were analyzed. 18.5% supplanting of smashed grainite with coconut shells can be used to create basic cement. What's more, it can be used as a fractional substitution of

pounded grainite or other tradational aggregates in strengthened cement development.

6. Jyothi kamal , j.p. singh (intercontinental magazine of modern study in production and technology) june 2015
This paper is primarily comprises of cement with fractional supplanting of coarse aggregate with coconut shell and cement with flyash. Finally they reasoned that increment in rate substitution by coconut shell builds workability of cement. light weight cement can be set up by utilizing coconut shell as coarse aggregate. permeable voids and water maintenance increases with development in CS substitution.

III. TESTS ON HARDENED CONCRETE

OVERVIEW OF TESTS CONDUCTED
After the completion of casting of the required specimens, the specimens are kept for curing of 7 days and 28 days. The variations of the strength for the casted specimens are plotted in the graph.

The tests which I have conducted:
1) Compression strength test
2) Tensile strength test
3) FlexuralStrength test on PCC
4) FlexuralStrength test on RCC

COMPRESSION STRENGTH TEST:-
Compressive quality is characterized a most great resistance of a concrete shape to pivotal stacking. specimen of size 150 mm x 150mm x 150mm were utilized for pressure testing for every cluster of mix. Testing of examples was completed at the earliest opportunity subsequent to curing. The estimations of example measurements were taken before the testing. Cleaned and surface dried specimen were placed in the testing machine. Most extreme burden at which the specimen fizzled was recorded and compression strength was calculated.

Equation to find the compression strength : fcu = P / A

Where, P= Failure Load In Compression (KN)

A= Load Area Of The Cube (mm2)

COMPRESSIVE STRENGTH TEST RESULTS FOR 7 AND 28 DAYS

Weight In Kgs

Days	7 days		28 days	
	I	II	I	II
0% C.S	8.047	8.047	8.101	8.092
15% C.S	7.875	7.974	7.987	7.991
30% C.S	7.635	7.655	7.707	7.708
15% C.S & 20 % F.A	7.969	7.974	7.979	7.972
30% C.S & 20 % F.A	7.648	7.640	7.654	7.666

TABLE-9

Load (kn)

Days	7 days		28 days	
	I	II	I	II
0% C.S	585	540	710	750
15% C.S	450	415	660	640
30% C.S	340	325	550	530
15% C.S & 20 % F.A	375	335	590	610
30% C.S & 20 % F.A	215	250	480	475

TABLE-10

Strength (N/mm^2)

Days	0% CS	15% CS	30% CS	15 % CS & 20 % F.A	30 % CS & 20% F.A
7	25	19.22	14.78	15.77	10.34
28	32.44	28.88	23.98	26.67	21.22

From the above test results, it is clear that when coarse aggregate is substituted with CSA, the compressive strength is found to be reducing. This may be due to the fact that the failure of normal strength concrete is caused by bond failure of bonding b/n Coconut shell aggregate and cement-mortar. Bonding between mortar and Coconut shell aggregate is weaker than that of Coarse aggregate.

The decrease in strength was found to be high when replacement is done with coconut shell aggregate along with 20% Flyash.

SPLIT TENSILE STRENGTH TEST:-

This test was led on cylinders of size 150mm distance across and 300mm height. The testing of specimen ought to be completed at the earliest opportunity in the wake of curing. specimen measurements were measured before the testing. Cleaned and cured specimens set in the testing machine. The platen was brought and was allowed down to touch the top surface of the specimen. The force was applied and increased continuously. Max. load at which the specimen failed was recorded and split tensile strength was calculated.

Formula to find out the split tensile strength : Ft= 2P/pi LD

Where, Ft = tensile strength (N/mm2)

P = load at failure (N)

L = length of cylinder (mm)

D = diameter of cylinder

TENSILE STRENGTH TEST RESULTS FOR 7 AND 28 DAYS

Load (kn)

Days	7 days		28 days	
	I	II	I	II
0% C.S	165	168	250	255
15% C.S	150	155	235	235
30% C.S	135	130	190	190
15% C.S & 20 % F.A	140	140	210	205
30% C.S & 20 % F.A	120	110	160	160

FLEXURAL STRENGTH TEST ON PLAIN CEMENT CONCRETE

For this test the beams of dimensions 100mmX100mmX500mm were casted. Flexural quality otherwise called modulus of crack, modulus of rupture, or fracture quality. The flexural quality represents to the most highest stress material experienced inside the material at its movement of rupture. The beam tests are observed to be trustworthy to quantify flexural quality. "modulus of rupture"(MoR) is around 12% to 20% of compressive quality. Be that as it may, the best relationship of specific materials is gotten by research facility tests. Flexural tests are more extremely sensitive to the specimen arrangement, handeling, curing and setting in the machine for testing. a short time of drying in the shaft can deliver a sharp drop in the flexural quality of the specimen.

Equation to discover the flexural quality of concrete ; Fb = pl/(bd2)

Where; b = measured width in (m) of the specimen,

d = measured profundity in (m) of the specimen at the point of failure,

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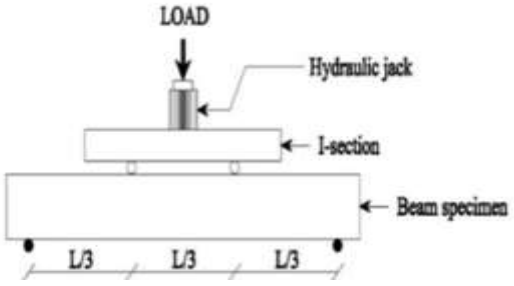
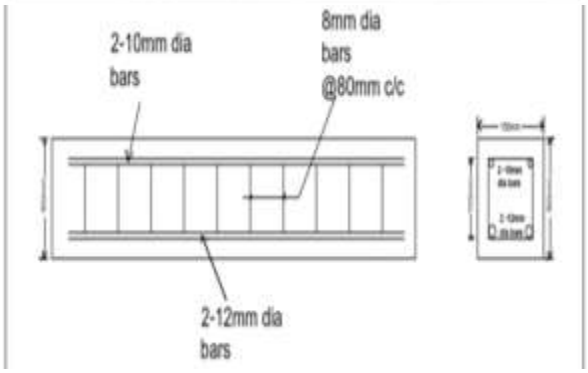




THEORETICAL LOAD OF BEAM :-

In a structural designs , an amount of design burden is higher than the burden which the system is relied to the backing. Because specialists incorporate a security factor in a design, , with a specific end goal to guarantee that the system will ready to support atleast the normal burdens called hypothetical burdens(load).

Therefore; dimensions of the beam (900mm x 150mm x 150mm)

$M_u = 0.36\, f_{ck}\, b x_u\, (d - 0.42 x_u)$

$M_u = 0.36 \times 25 \times 0.150 \times 0.46 \times 0.110\ (0.110 - 0.42 \times 0.46 \times 0.110)$

$M_u = 6.06$ KN-m

L = 700mm

WL/6 = 6.06

W x 700 / 6 = 6.06

W =51.4 (expected theoretical load for conventional concrete)

TEST SPECIMEN DETAILS

The elements of the mix were weighed and blended (mixed) in the cement blend machine according to the cement mix design. The steel mold was utilized for throwing the bar specimens. Before blending the cement, the molds were kept arranged by setting it on a level surface. The sides and base of all the molds were legitimately lubed for simple demoulding. The cement was set in the mold in three layers and compaction was done utilizing packing bar. Appropriate nurture uniform compaction and surface culmination all through the beam.

TEST-SETUP:

The trials were led on a loading frame. The beams were tried as a simply supported beam with a measurement of 900mmx150mmx150mm. What's more, it is subjected to two point loading. The stacking set-up comprises of a loadcell, pressure driven jack and a hand pump to apply the load. The exploratory set-up is demonstrated as follows. Strain gauge was stuck on the compression side and tension side.

COST-ANALYSIS

This analysis was conved on and contrasted and every concrete sort. It was accepted that the expense of work and cost of other office necessities are same for both normal concrete and C.S. then again Flyash base c0ncrete. In this manner, these cost segments were not considered in this analysls. Amount of the material was resolved by extents. Measure of cement, flyash, sand, crushed stone and coconut shell were assessed weight premise.

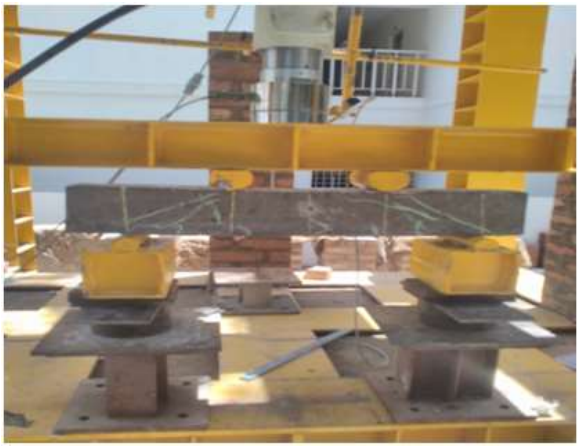
percentage replacement of C.A with C.S	Cost of building materials in concrete of 1m³ volume in Kn (mix M25 grade)					Cost of 1M³ of concrete	% reduction in cost
	cement	Fly ash	Sand	20mm crushed gravel	Coconut shells(CS)		
0%	3131.70	_	1264.64	697.24	0.00	5093.58	_
15%	3131.70	_	1264.64	592.66	0.00	4989	2.06
30%	3131.70	_	1264.64	488.04	0.00	4884.38	4.11
Percentage replacement of C.A with C.S & cement with flyash							
15% C.S & 20% F.A	2505.36	96.36	1256.72	581.70	0.00	4440.14	12.83
30% C.S & 20% F.A	2505.36	96.36	1256.72	479.04	0.00	4337.48	14.85

15% CS replacement

LOAD (Kn)	DEFLECTION (mm)	LVDT-1 (mm)	LVDT-2 (mm)	REMARKS
0	0	0.03	0.01	
10	0.2	0.05	0.23	
20	1.3	3.36	7.03	
30	2.8	5.56	8.66	
40	3.5	6.68	9.88	
50	4.2	8.45	10.65	
50.25	4.4	8.96	14.32	FIRST CRACK
60	5.8	14.01	14.28	
70	7.5	14.25	16.97	
72.40	8.2	15.75	18.36	ULTIMATE LOAD

15% CS & along with 20% flyash replacement

LOAD (Kn)	DEFLECTION (mm)	LVDT-1 (mm)	LVDT-2 (mm)	REMARKS
0	0.0	0.05	0.02	
10	0.5	0.36	0.39	
20	1.3	4.01	6.03	
30	2.9	4.18	7.93	
35.87	3.4	5.69	8.98	FIRST CRACK
40	4.2	6.81	10.02	
50	5.8	8.67	11.08	
60	6.2	8.99	11.87	
64.24	8.1	9.54		ULTIMATE LOAD



Load carrying capacity

The beam strength with 10% CS is 82.15 Kn. With a redirection (i.e;deflection) of 7.6 mm, The beam strength with 15% CS is 72.40 Kn. With a redirection of 8.2 mm, The beam strength with 15% CS along with 20% replacement of flyash is 64.24 Kn. With a redirection of 8.1 mm.

FLEXURAL STRENGTH OF CONCRETE BEAMS

Sl.no	Percentage Replacement	Ultimate Load (KN)	Deflection (mm)	FLEXURAL STRENGTH (N/mm²)
1	0%	82.15	7.6	17.05
2	15% CS	72.40	8.2	15.01
3	15% CS along with 20% FA	64.24	8.1	13.32

V. CONCLUSION

a) Utilizing more Replacement of coconut shells, It decreases the compressive, tensile and Flexural nature of concrete.

b) Increase in rate of C.S, decreases the densities of concrete.

c) Increase in rate substitution by coconut shell builds workability of concrete .

d) Light weight concrete can be set up by utilizing coconut shells, as coarse aggregate.

e) When the different Percentage of CS as 15% and 30% is replaced in concrete with coarse aggregate. the compressive strength, split tensile strength, are more as compared to concrete replaced by coconut shell as 15% and30% along with cement replaced by 20% fly ash.

f) water absorption increases with increase in CS replacement.

1. The study can be done with differing rate swap of the material for particular ease housing applications.

2. Building properties like water ingestion, diminishment in weight of cement and study on financial perspectives can be completed.

3. Impact of temperature on the concrete created can be contemplated.

4. Impact of various admixtures can be measured on CS concrete.

5. Durability considers on CS concrete ought to be done to evaluate its conduct in forceful situations.

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