

## Vigour Behaviour of Cement Concrete by Supplementing the Shredded Coconut Shells & Calcium Carbonate Crystals as Fine Aggregate at Different Dosages, Class C- Fly ASH for the Cement

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### ABSTRACT:

The twenty first century facing a lot of scarcity in the building materials for constructions , cost of building materials & scarcity is improving day by day , usage of alternative materials is a boon partial replacement of cement & coarse aggregate, fine aggregate is become prominent , The waste materials used such as coconut shells, calcium crystals which are major in egg shells , thermal ash which is either CLASS -C , foundry sand etcThe usage of these materials improving in concrete production is a becoming famous the assessment of the pozzolonic activity of cement replacement materials is becoming increasingly important because of the need for more sustainable cementing products. Coconut powder and egg shell powder is used as partial replacement in concrete ranges of 5%, 10 %, 15 %, 20% for M25 grade. On the basis previous citations it is a cost effective gives improvement properties to the concrete. Producing the cubes and other test specimens for interpretation of results to assess the compressive and tensile strength of concrete. As we expected while interpreting the cubes are tested and gave enormous results.

### INTRODUCTION:

Concrete is the widely used number one structural material in the world today, high cost of cement, used as binder, in the production of mortar, sand blocks, lan-crete bricks and concrete has led to a search for another alternative. The overall relevavant for concrete in virtually engineering practice and building construction works cannot be overemphasized. The increasing concern of resource depletion and global pollution has challenged many researchers and engineers to seek and develop new materials relying on renewable resources. These include the use of waste prodcuts and waste materials in structural construction. Many of these by-products are used as aggregate for the production of lightweight concrete Cement and concrete is the most common building materials in the world. huge popularity is a resulting of several improvements such as general availability, wide applicability and low cost. These advantages are also accompanied by a great environmental depletion and burden. Thousand billions of tons of raw materials are mined and processed each year leave a mark on the environment. moreover, during the production of Portland cement large quantities of CO<sub>2</sub> are released into the atmosphere and enormous amount of energy are required. Portland cement is one of the most important ingredients of concrete. With the recession arised globally coupled with the market inflationary trends, the constituent materials used for these civil engineering projects had led to a very high cost of construction. To a huge extent, on concrete as major construction material. The versatility, strength and durability of cement are of utmost priority over other construction materials. The basic materials for concrete are: cement, fine aggregate, coarse aggregate and water, the overall cost of concrete production depends largely on the availability of these constituents. Reduction in construction costs and the ability to produce light-weight

concrete structures (LWC) are added advantages. The primary aim is to determining the suitability of partial replacement of cement with coconut shell Powder (CSP) and Egg shell powder (ESP) in concrete.

#### OBJECTIVES:

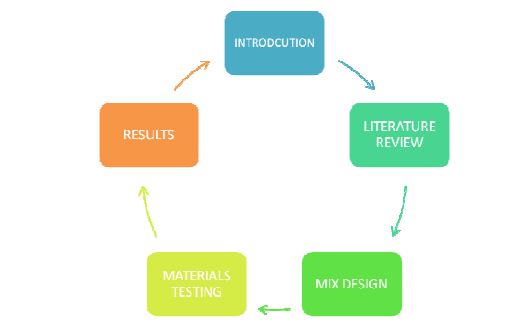
The objectives of this study are as follows:

- a) To establish the best mix proportion of the partial replacement of egg shell powder for cement in concrete by the value of strength per weight ratio of sample specimen.
- b) To improve the feasibility of the partial replacement of above material in concrete by determining its compressive strength and split tensile strength.
- c) Based on the test results, to suggest most approximate level of adding egg shell powder, coconut shell powder & fly ash

#### SCOPE OF THE STUDY

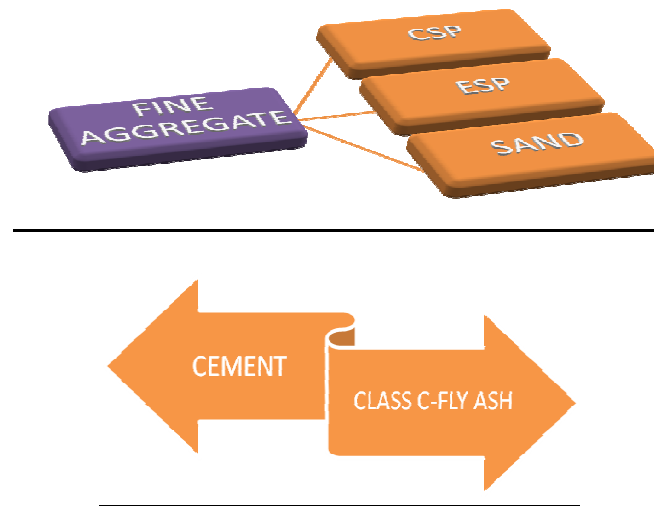
Usage of cement can be diminished significantly if eggshell powder used as a partial replacement without compromising performance characteristics of concrete including durability. The scope of study is to establish to achieve the objectives and this study will be mainly concentrated on experimental works. Experiments regarding compression strength and split tensile strength on the partial replacement of ESP, CSP in cement concrete will be carried out in order to study the behaviour of concrete. All testing methods and procedures are specified according to Indian code books

#### RESEARCH FRAME WORK



#### Materials

- a) Cement (53 grade)
- b) Fine aggregate
- c) Coarse aggregate
- d) Coconut shell powder (CSP)
- e) Egg shell powder(ESP)
- f) Fly ash



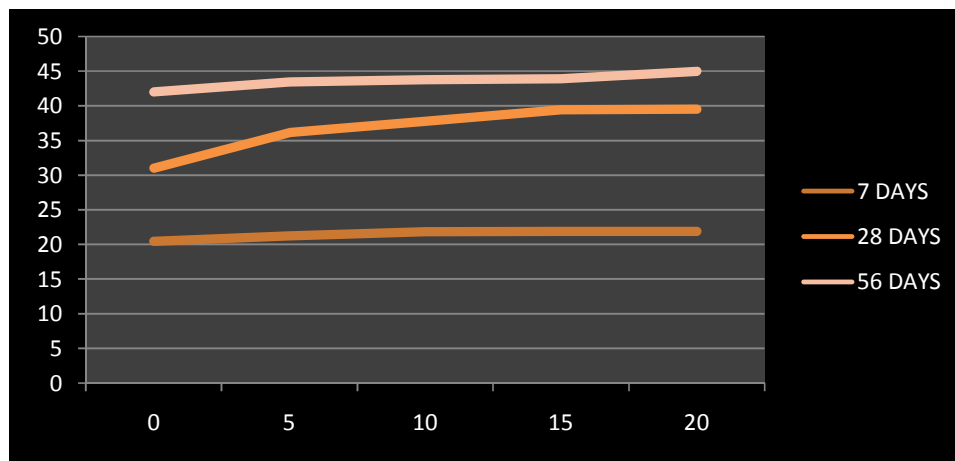
**TEST REPORTS:**

*Combined replacement of materials average compressive strength results of cement concrete cubes*

S.NO	CUBE ID	% OF REPLACEMNT(C+E+F)	AVERAGE C.C @ 7DAYS
1	CEF-1	0	20.45
2	CEF-2	5	21.23
3	CEF-3	10	21.83
4	CEF-4	15	21.89
5	CEF-5	20	21.89

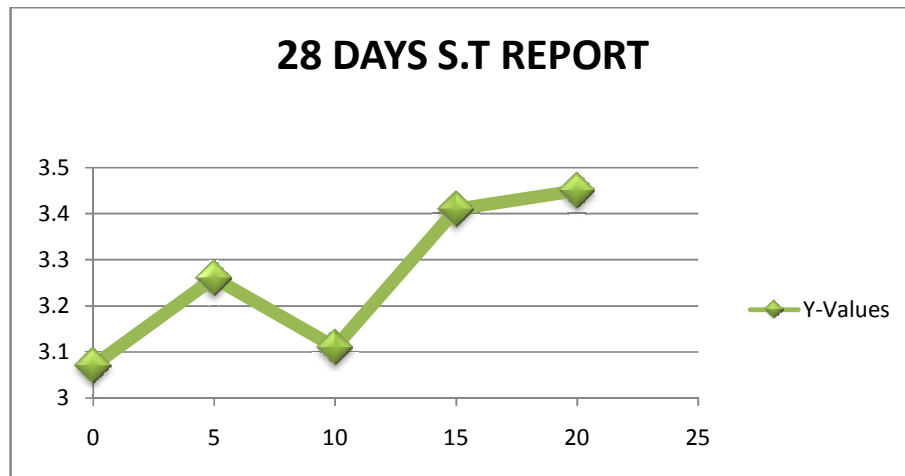
S.NO	CUBE ID	% OF REPLACEMNT(C+E+F)	AVERAGE C.C @ 28DAYS
1	CEF-6	0	31.00
2	CEF-7	5	36.12
3	CEF-8	10	37.75
4	CEF-9	15	39.42
5	CEF-10	20	39.49

S.NO	CUBE ID	% OF REPLACEMENT(C+E+F)	AVERAGE C.C @ 56 DAYS
1	CEF-11	0	41.98
2	CEF-12	5	43.43
3	CEF-13	10	43.76
4	CEF-14	15	43.87
5	CEF-15	20	44.97

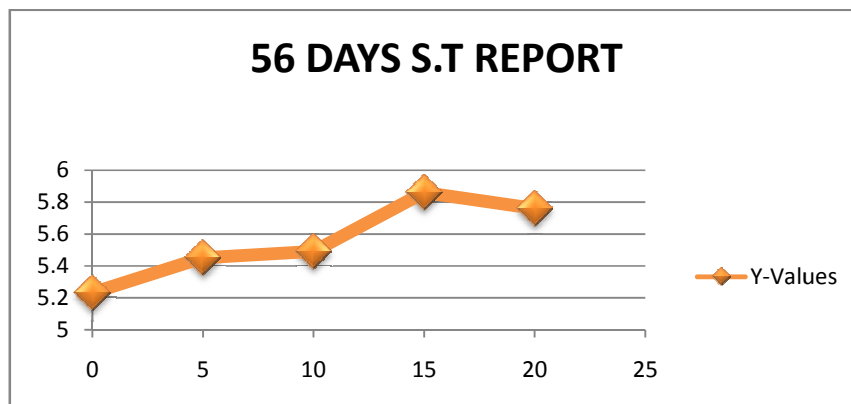


**SPLIT TESNILE STRENGTH REPORTS**

S.NO	C-ID	% of replacement of (CSP+ESP+FA)	28 DAYS
1	CEF-A	0	3.07
2	CEF-B	5	3.26
3	CEF-C	10	3.11
4	CEF-D	15	3.41
5	CEF-E	20	3.45



S.NO	C-ID	% of replacement of (CSP+ESP+FA)	56 DAYS
1	CEF-F	0	5.23
2	CEF-G	5	5.45
3	CEF-H	10	5.49
4	CEF-I	15	5.86
5	CEF-J	20	5.76



**ULTRASONIC PULSE VELOCITY TEST REPORTS FOR CUBES:**

S NO	CUBE ID	% REPLACEMENT OF (ESP+CSP+FA)	Obtained average velocity(m/s)	Quality of Concrete
1	CEF-1	0	3821	Good
2	CEF-1	5	4245	Good
3	CEF-1	10	4287	Good
4	CEF-1	15	4891	Excellent
5	CEF-1	20	4896	Excellent

S NO	CUBE ID	% REPLACEMENT OF (ESP+CSP+FA)	Obtained average velocity(m/s)	Quality of Concrete
1	CEF-6	0	3567	Good
2	CEF-7	5	4123	Good
3	CEF-8	10	4298	Good
4	CEF-9	15	4876	Excellent
5	CEF-10	20	4878	Good

S NO	CUBE ID	% REPLACEMENT OF (ESP+CSP+FA)	Obtained average velocity(m/s)	Quality of Concrete
1	CEF-11	0	3123	Good
2	CEF-12	5	4444	Good
3	CEF-13	10	4743	Excellent
4	CEF-14	15	4574	Excellent
5	CEF-15	20	4134	Good

## **DISCUSSIONS & RESULTS**

- ♣ CEF-1 posses 20.45 Mpa for genuine concrete mix
- ♣ CEF-2 Posses 21.23 Mpa for blended concrete mix
- ♣ CEF-3 shows slight increment in the compressive strength
- ♣ CEF-4 also giving same compressive strength with slight varies
- ♣ CEF-5 gave a good compressive as CEF-4
- ♣ Lke that we analyzed the report from the three curing reports of the cubes with ID –CEF-7, CEF-8, CEF9, having good compressive strength report compared to all the Cube reports.
- ♣ Finally from the compressive strength reports it shows the replacements of blend is very cost effective and giving good compressive strength results when it replaced
- ♣ But in this experimental work EGG SHELL powder making is a late process and bringing form outdoor is difficult
- ♣ Coconut powder making from grinding is easy but storage and sieving is very hard while doing
- ♣ Fly ash is good admixture to the concrete mix .over all by this coconut powder and fly ash mixing is easy .egg shell powder in not a sufficient one to do these high strength concretes.
- ♣ Split tensile strength results giving a satisfactory results at 28 days and 56 days
- ♣ The tensile property of concrete is little bit increment at some mixing dosages
- ♣ After completion of the UPV test results are also gave a excellent report at 56 days report at 15 % replacement of CEF.
- ♣ Based on flexure it shows very good results at ages 28 , 56 days but one thing from the result the flexure values are decreased when after ten percentage replacements.
- ♣ But overall replacements with CEF shows very satisfactory reports

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