Experimental Behavior of Light Weight Concrete Incorporating With Rice Husk Ash ,Palm Kernel Shells And Basalt Sand In Different Percentages

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Abstract- *Concrete is the most versatile construction material because it can be designed to withstand the harshest environments while taking on the most inspirational forms. Engineers are continually pushing the limits to improve its performance with the help of innovative chemical admixtures and supplementary cementitious materials. With the increase on demand of concrete, there is a huge emission of co2 from the concrete which leads environmental damage. To avoid this ecological imbalance, investigations are motivated for the for the utilization of waste and bi products. To meet the requirements of globalization in the construction of building, concrete play major role. For one tone production of clinkers we are using 1.7 tones of lime stone and clay .Around 850 kg of co2 produced .Hence we need to focus on new substitute materials. In this project ,the Behavior of M25 grade concrete by replacement of cement with RHA at 10 and 20 percentages by its weight, palm kernel shells replacing coarse aggregate 10,20% by its weight in concrete ,Basalt sand replacing fine aggregate by 10,20,30 and 40% of weight in concrete and conventional concrete is prepared with optimum percentage of each. Thus the mechanical properties and increase of strength characteristics will be discussed in conclusions*

I. INTRODUCTION

In the ancient period construction work was mostly carried out with thehelp of mudstone from industry. While Concrete today has assumed the position of the most widely used building material globally. In developing countries where concrete is widely used, the high and steadily increasing cost of concrete has made construction is very expensive. This project is experimented to reduce the cost construction and increase strength & durability. But the usage of cement in concrete causes lot of environmental pollution due to emission of greenhouse gases. So that it is necessary to reduce usage of cement by introducing new supplementary cementious materials which are the by-products of industries to reduce to relative problem.

The most expensive concrete material is the binder (cement) and if such important expensive material is partially replaced with more natural, local and affordable material like RHA will not only take care of waste management but will also reduce the problem of high cost of concrete and housing. Considerable efforts are being taken worldwide to utilize natural waste and by-product as supplementary cementing materials to improve the properties of cement concrete.Rice Husk Ash (RHA) and Fly ash (FA) are such materials. Rice HuskAsh (RHA) is an agricultural waste product, and how to dispose of it is a problem to waste managers. It is by-product of Paddy industry. It is a highly reactive pozzolanic material produced by controlled burning of Rice Husk.

The concrete industry today is the largest consumer of limited natural resources, such as water, sand, gravel and crushed rock. Construction by its very nature is not necessarily an environmentally-friendly activity; therefore, the best alternative to achieve sustainable development of the concrete industry is the use of waste and by-product materials instead of raw materials in the concrete mixture. The environmental impact of oil palm cultivation is a highly controversial topic. Oil palm shells (OPS) are agricultural solid end products of oil palm manufacturing processes. Palm trees grow in regions where the temperature is hot with copious rainfall. A prevailing problem in the processing of palm oil is the large amounts of byproducts produced such as empty fruit bunches (EFB), palm kernel shells (PKS), oil palm shells (OPS), and palm oil mill effluent (POME). These by-products are one of the main contributors to the nation’s pollution problem. In that PKS is one of most important wastes produced. Concrete is an assemblage of cement, aggregate and water. The most frequently used fine aggregate is sand derived from river banks. The worldwide utilization of natural sand is too high due to its widespread use in concrete. The insist for natural sand is quite high in developing countries due to rapid infrastructural growth which results make available scarcity. Consequently, construction industries of developing countries are in stress to recognize substitute materials to replace the demand for natural sand. In this framework, fine aggregate has been replaced by basalt sand a byproduct of stone crushing unit and few admixtures to determine a proportional analysis for different parameters which are tested in the laboratories to determine the appropriateness of the replacement adhere to the Indian Standard specifications for its strength. Basalt sand has been used for diverse activities in the construction industry such as road construction and fabricate of building materials such as light weight aggregates, bricks, and tiles. Crushed rock aggregates are more appropriate for production of high strength concrete compared to natural gravel and sand. Basalt sand is a by-product obtained from crushing of basalt rock. It is a common extrusive volcanic rock

II. REVIEW OF LITERATURE

Suribabu, Dr.U.Rangaraju, Dr.M. Ravindra Krishna P. (An ISO 3297: 2007 Certified Organization) Vol. 4, Issue 1, January2015 For the designed mix proportions of M25 and M40 grades of concrete the desired characteristic strengths for cubes are achieved in both conventional concrete and Quarry Stone dust concrete The strength achieved in concrete made with sand as fine aggregate achieved high strengths when compared with Quarry stone dust concrete. However, in both the cases strengths were falling at a super plasticizer dosage of 1.3% by weight of cement. Similar behaviour was also observed in cubes of M40 grade cubes In M40 grade cubes it was observed that at 1.3% dosage of super plasticizer the compressive strength is decreased.

ShaikFayaz, Shaik Rashid, K.Yugandhara Reddy. Vol. 03, Issue 07,July2017, pp.105- 112 These subsequent conclusions are given based on the above investigational and experimental results In the current investigation objective mean strength of concrete for M20 and M30 grades that are productively achieved The material Quarry dust is a good substitute to replace River sand that it satisfied all the necessities as well as natural sand and it can be used for all constructional purposes in place of natural sand for sustainable constructions For M20 grade, utmost compressive strength of 28.44Mpa, Split tensile strength of 2.84Mpa and Flexural strength of 3.32Mpa has take place for Trail 2 i.e., 40% Quarry dust. For M30 grade, utmost compressive strength of 37.78Mpa, Split tensile strength of 3.70Mpa, flexural strength of 3.90Mpa has occurred for Trail2 . By the replacement of 40% Quarry dust in Trail 2 for M20grade, from 7days to 28days the rate of boost in compressive strength is of 22.64% and flexural strength is of 5.42% and split tensile strength is of 6.69%. For M30 grade, the rate of augment in compressive strength is of 22.94% and flexural and split tensile strengths are of 5.64% and2.16%.

Kannan, K. Subramanian and M.I.AbdulAleem. Volume 2, Issue 3 (V): July – September,2014 Quarry Dust shall be used as a partial replacement for sand in concrete works Washed samples of Quarry Dust satisfied the criteria for fine aggregates as per the BIS specifications.

The optimum replacement for natural sand by quarry sand is 60%. Washed quarry dust can be used for reinforced concrete works

G. Balamurugan, Dr.P.Peruma. Volume 3, Issue 12, December 2013 Concrete acquires maximum increase in compressive strength at 50% sand replacement. The percentage of increase in strength with respect to control concrete is 24.04 & 6.10 in M20 and M25respectively After heated to 100°C, the maximum compressive strength is obtained at 50% sand replacement. The percentage of reduction in strength with respect to control concrete is 6.67 & 13.80 in M20 and M25respectively.

P.P.Taralekar, M.V.Nagendra. Volume: 05 Issue: 10, Oct 2018 The experimental results proved that the compressive strength of cubes with 50% M-sand gives the strength nearby same as that with 0% M-sand. From the results it concludes upto 50% there is increase in strength but beyond 50% replacement it gives lower in strength. The flexural strength test result proves that we can replace M-sand with 50% replacement effectively and it gives the strength nearby same as it with 0%replacement. From above we can conclude that we can replace Natural sand with 50% of M-sand effectively and it proves to be economical

George Washington, Kshyana Prava Samal, Zishane Haider, Polin Kumar Sahoo. RDESHM-17 24th December 2017 At all the cement replacement levels of rice husk ash; there is gradual increase in compressive strength from 7 days to 14 days. However there is significant increase in compressive strength from 7 days to 28 days followed by gradual increase after 28days . By using this Rice husk ash in concrete as replacement the emission of greenhouse gases can be decreased to a greater extent. As a result there is greater possibility to gain more number of carbon credits . Use of RHA shows a drastic increase in the amount of water required during the preparation. Standard mixes of concrete uses less amount of water as compared to Rha.Rice husk ash mix mortar is a reduction weight of structure

Aravind Kumar, Amit Kumar Tomar, ShravanKishor Gupta, Ankit Kumar. Volume 3 Issue 7 – July 2016

At all the bond substitution levels of Rice husk fiery debris; there is slow increment in compressive quality from 3 days to 7 days. However there is huge expansion in compressive quality from 7 days to 28 days took after by slow increment from 28days By utilizing this Rice husk fiery debris as a part of concrete as substitution the discharge of nursery gasses can be diminished to be a more noteworthy degree. Therefore there is more prominent plausibility to acquire number of carboncredits

LokeshBhai Patel, Dr. G.P. Khare, Mr. Dushyant Kumar Sahu, Volume: 05 Issue: 01, Jan-2018 From the experimental results, the conclusion of consistency initial and final setting time of cementations materials, workability and compressive strength of hardened concrete are concluded as under: When we replace cement only with fly ash, then the consistency of cement continuously get diminished. But when we add fly ash and rice husk ash in different ratio in the cement than the consistency of cementations materials increase according to the adding of quantity of rice husk ash. In the case of setting time ofcementations materials initial and final setting time depend upon the quantity of fly ash, with the addition of rice husk ash in the fly ash cement concrete, initial and final setting time decrease because rice husk ash increase the hydration ofcement. According the results of compressive strength, when only fly ash is present in the concrete as other cementations materials the rate of compressive strength from 7 days to 28 days slows down but rice husk ash increase the rate of compressive strength from 7 days to 28 days. As the results of the experiments batch (D-2) as 70% cement 20% fly ash and 10% rice husk ash, the compressive strength is highest for 28 days. But the rate of compressive strength of batch (D3) is speedily increased from 7 days to 28 days.

Ming KunYew, Hilmi Bin Mahmud, Bee Chin Ang, and Ming Chian Yew. Received 6 March 2014; Revised 22 April 2014; Accepted 22 April 2014; Published 29 May 2014 A high early compressive strength was achieved for all mixes in this study,which may be due to the addition of silica fume. The addition of silica fume greatly reduces permeability and improves aggregate-cement paste interface of the concrete and consequently minimizes the induction of microcracks The workability of concrete can be enhanced by increasing the age category of OPS aggregates. In general, all mixes achieved good and highworkability. OPS aggregates can be used as an environmental friendly alternative to enhance the compressive strength of OPSLWC, provided that suitable OPS species and age category as well as size of the OPS aggregates areselected
JerinAbrahama j, Karthigab s,Pavithrac c. Received 17 June, 2017; accepted 22 August, 2017 Based on initial tests performed, Palm Shell has good potential to be used as replacement for coarse aggregate as light weight aggregate inconcrete

R. M. Ponmani Deva & R. Shanmugapriyan. Impact Factor 6.525, Special Issue, April – 2017 Analysis of the strength characteristics of light weight concrete containing renewable resources of palm shell and microsilica. Lightweight concrete has established itself as a suitable. In general, palm shell has good potential as a coarse aggregate in structural concrete production and can even be used for low to moderate strength applications such as structural members for low cost houses. Based on this investigation the work can be done.

Khan M. M. H, Guong Wei L. Deepak T. J. Nair S
with the increasing amounts of aggregates replaced by OPS, water absorption of the lightweight concrete increases gradually. Overall, it can be concluded that, the use of OPS is a suitable alternative to the conventional building materials. The use of OPS in concrete can help to overcome the over dependence on the natural resources such as coarse aggregates

III. METHODOLOGY

3.1 Materials Used And Their Properties;- Concrete is a mixture of various materials. It is mainly consists of cement, fine aggregate, coarse aggregate and water. In this experimental study, we are replacing cement with rice husk ash, fine aggregate with basalt sand and coarse aggregate with palm kernel shells. The above mentioned materials are discussed below

CEMENT: Cement has different properties and characteristics which depend upon their chemical compositions. By changing in fineness of grinding, oxide compositions cement have exhibit different properties and different kind of cement. The use of additives, changing chemical composition, and use of different raw materials have resulted the availability of many types of cements. Cement used in the experimental work is Ordinary Portland Cement of 53 grades conforming toIS:12269-1987

FINEAGGREGATE: Aggregate whose sizes are lesser than 4.75 mm are fine aggregate which satisfied the required properties for experimental work and conforms as per the specification of IS: 383- 1970.Sand is a naturally and obviously occurring granular material collected of finely divided rock and mineral particles. The composition of sand is extremely variable, depending on the local rock sources and conditions, but the for the most part frequent constituent of sand in inland continental settings and non-tropical coastal settings is silica (silicon dioxide, or SiO_2), usually in the form of quartz.

COARSE AGGREGATE: Construction aggregate, or simply "aggregate", is a wide group of coarse particulate material used in construction, as well as sand, gravel, crushed stone, slag, recycled concrete and geo synthetic aggregates.

Aggregates are the majority mined materials in the world. Aggregates are a constituent of composite materials such as concrete and asphalt concrete; the aggregate serve as reinforcement to insert strength to the overall composite material

RICE HUSK ASH; Rice husk ash has pozzolanic and high percentage of silica which helps in strengthening the concrete and making it corrosion resistant. It is used as an admixture in foreign country but in India it is considered as a waste product. Locally collected burnt RHA grinded and sieved through 90 micron sieve is used in this experiment

PALM KERNEL SHELLS: Through the compressive strength of palm kernel shell concrete fulfills the requirement of lightweight concretes, higher strength of about 30MPa is preferred for medium strength structural members

The smooth surface of palm kernel shell resulted in weaker bonded, which in turn effected in mechanical properties. Specific gravity of PKS is less than compared to the common rocks

BASALT SAND: It is a dark coloured, fine grained, igneous rock. It is generally in black or gray in color It is composed of minerals like pyroxene and feldspar. Generally 50% of basalt is composed of silica. Specific Gravity: 2.3

3.1 ***Dimensions Of Cube And Cylinder Moulds:***

LABEL	MATERIALS	DIMENSIONS (mm)	GRADE	% OF REPLACEMENT
NORMAL CONCRETE	NC	150x150x150	M25	-
RICE HUSK ASH CONCRETE	NCRHA	150x150x150	M25	10,20
PALM KERNEL SHELL CONCRETE	NC+PKS	150x150x150	M25	10,20
BASALT SAND CONCRETE	NC+BS	150x150x150	M25	10,20,30,40
CONVENTIONAL CONCRETE	NC+RHA+PKS +BS	150x150x150	M25	OPTIMUM CONTENTS

Table. 3.2:Dimensions Of Cylinder

LABEL	MATERIALS	DIMENSION (mm)		GRADE	% OF REPLACEMENT
		DIAMETER	LENGTH		
NORMAL CONCRETE	NC	150	300	M25	-
RICE HUSK ASH CONCRETE	NC+RHA	150	300	M25	10,20
PALM KERNEL SHELL CONCRETE	NC+PKS	150	300	M25	10,20
BASALT SAND CONCRETE	NC+BS	150	300	M25	10,20,30,40
CONVENTIONAL CONCRETE	NC+RHA+PKS+BS	150	300	M25	OPTIMUM CONTENTS

Sampling Of Materials; Representative samples of the materials of concrete for use in the particular concrete construction work shall be obtained by careful sampling. Test samples of cement shall be made up of a small portion taken from each of a number of bags on the site, test samples of aggregate shall be taken larger lots by quartering

MIX PROPORTION - M25:

M25Grade concrete was produced using only commercially available materials with normal mixing and curing techniques. Trial mix designs had been prepared before the start of the experiments

Table: 4.1 MIX PROPORTION -M25

Concrete strength N/mm2	Water/ cement ratio	Mix proportions (to weight of concrete)			
		Cement	Fine aggregate	Coarse Aggregate	W/c ratio
25	0.45	1	1	2	0.45

4.2 CASTING AND CURING

1. In our project, we are going to cast and test 90 cubes and 60cylinders
2. For 7 days, 14 days, 28 days compressive and split tensile strengths are calculated.
3. Cement is replaced with rice husk ash in the percentages 10%, 20%. For 7 days 3 specimens, 14 days 3 specimens, and 28 days 3 cubes specimens are casted. Similarly 2 cylindrical specimens are casted for each 7,14 and 28days
4. Fine aggregate is replaced with Basalt sand in the percentages 10%, 20%,30% & 40%. For 7 days 3 specimens, 14 days 3 specimens, and 28 days 3 cubes specimens are casted. Similarly 2 cylindrical specimens are casted for each 7, 14 and 28days

5. Coarse aggreagate is replaced with palm kernel shell in the percentages 10%, 20%. For 7 days 3 specimens, 14 days 3 specimens, and 28 days 3 cubes specimens are casted. Similarly 2 cylindrical specimens are casted for each 7,14 and 28days.

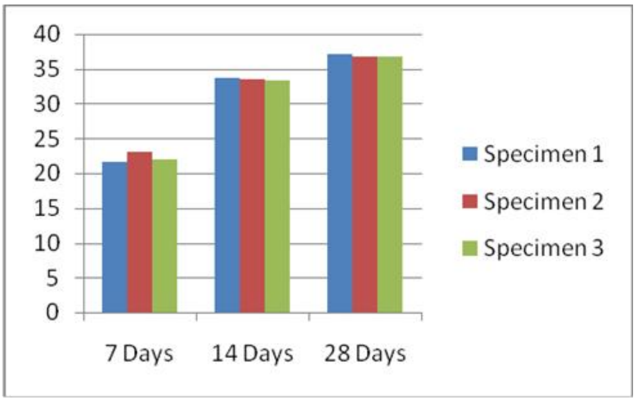
IV. RESULTS AND DISCUSSIONS

COMPRESSIVE STRENGTHS OFCUBES; According to the IS 516-1959 provisions compressive strengths of concrete cubes are tested

***NORMALCONCRETE*:** To compare the compressive strengths of normal concrete cubes are casted. The following are the compressive strengths of normal concrete

Table. 4.1: Compressive strengths of normal concrete

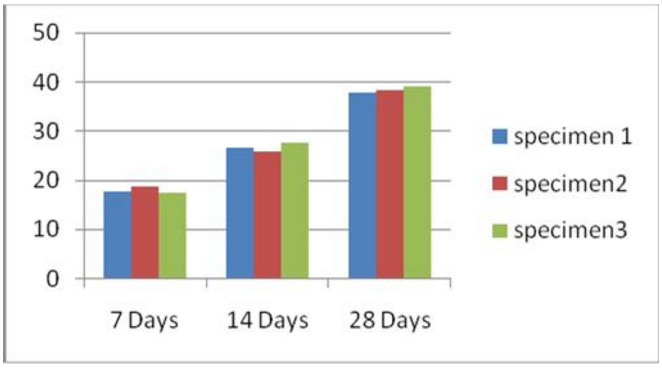
DAYS OF CURING	LOAD (kN)			COMPRESSIVE STRENGTH (N/mm^2)			AVERAGE COMPRESSIVE STRENGTH(N/mm^2)
	1	2	3	1	2	3	
7	486	518	495	21.6	23	22	22.2
14	760	754	752	33.7	33.5	33.4	33.53
28	836	829	827	37.15	36.8	36.75	36.9



***RICE HUSKASH*:** Cement is replaced with rice husk ash in the proportions 10% and 20% to get the optimum content at which RHA concrete is getting maximum compressive strength

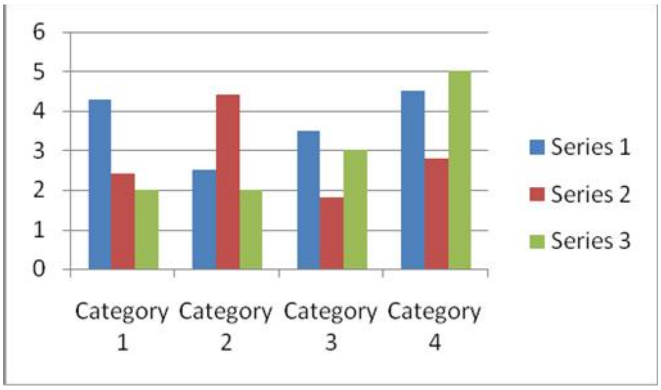
Compressive strengths of rice husk ash concrete – 10%

DAYS OF CURING	LOAD (KN)			COMPRESSIVE STRENGTH (N/mm^2)			AVERAGE COMPRESSIVE STRENGTH (N/mm^2)
	1	2	3	1	2	3	
7	400	420	395	17.77	18.66	17.55	17.99
14	600	580	620	26.66	25.77	27.55	26.66
28	850	860	880	37.77	38.22	39.11	38.36



Graph COMPRESSIVE STRENGTH OF RHAC (10 %)

DAYS OF CURING	LOAD (kN)			COMPRESSIVE STRENGTH (N/mm^2)			AVERAGE COMPRESSIVE STRENGTH (N/mm^2)
	1	2	3	1	2	3	
7	350	340	365	15.55	15.11	16.22	15.63
14	484	471	505	21.51	20.93	22.44	21.62
28	533	540	565	23.68	24.00	25.11	24.26



***PALM KERNEL SHELLS*:** Coarse aggregate is replaced with palm kernel shells in the proportions 10% and 20% to get the optimum content at which PKS concrete is getting maximum compressive strength

Compressive strengths of palm kernel shell concrete –10%

DAYS OF CURING	LOAD (KN)			COMPRESSIVE STRENGTH (N/mm²)			AVERAGE COMPRESSIVE STRENGTH (N/mm²)
	1	2	3	1	2	3	
7	600	620	650	26.66	27.55	28.88	27.70
14	830	860	870	36.88	38.22	38.66	37.92
28	868	900	915	38.57	40.00	40.66	39.74

Compressive strengths of palm kernel shell concrete –20%

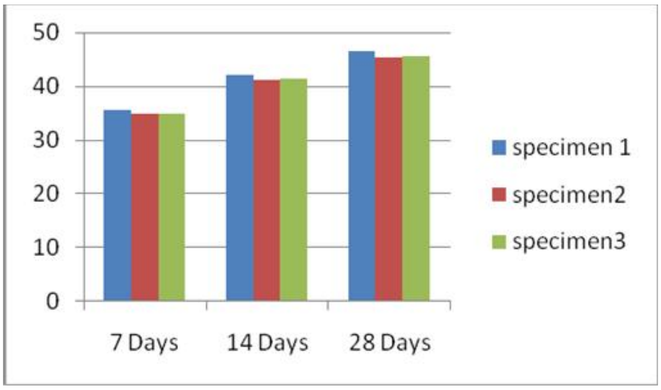
DAYS OF CURING	LOAD (KN)			COMPRESSIVE STRENGTH (N/mm²)			AVERAGE COMPRESSIVE STRENGTH (N/mm²)
	1	2	3	1	2	3	
7	300	360	335	13.33	16.00	14.88	14.74
14	415	498	454	18.44	22.13	20.17	20.24
28	504	559	525	22.4	24.84	23.33	23.52

BASALT SAND:

Fine aggregates replaced with basalt sand in the proportions 10% ,20%,30%and 40% to get the optimum content at which BASALT SAND concrete is getting maximum compressive strength

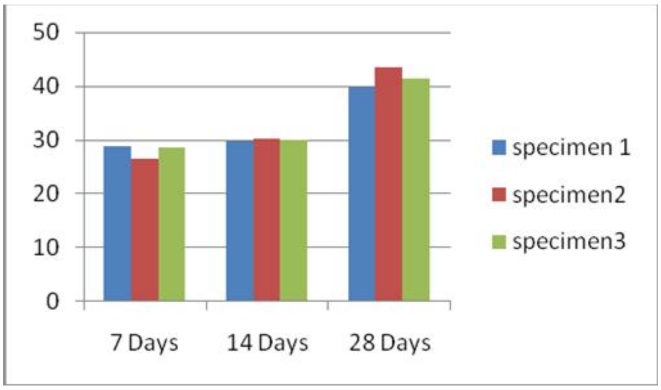
Compressive strengths of basalt sand concrete – 10%

DAYS OF CURING	LOAD (kN)			COMPRESSIVE STRENGTH (N/mm²)			AVERAGE COMPRESSIVE STRENGTH (N/mm²)
	1	2	3	1	2	3	
7	803	784	788	35.68	34.8	35.00	35.16
14	950	925	934	42.2	41.11	41.5	41.60
28	1045	1018	1027	46.4	45.24	45.64	45.76



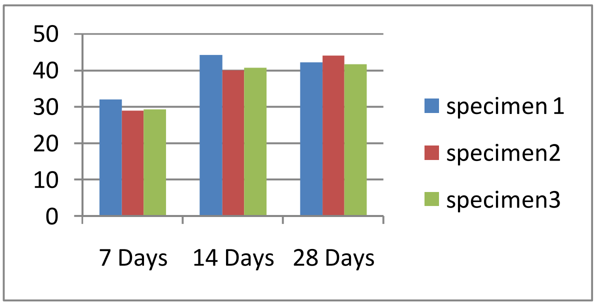
Compressive strengths of basalt sand concrete –20%

DAYS OF CURING	LOAD (kN)			COMPRESSIVE STRENGTH (N/mm²)			AVERAGECOMPRESSIVE STRENGTH (N/mm²)
	1	2	3	1	2	3	
7	647	642	644	28.75	26.53	28.65	27.97
14	672	678	675	29.86	30.13	30.00	29.99
28	895	977	930	39.77	43.42	41.33	41.50



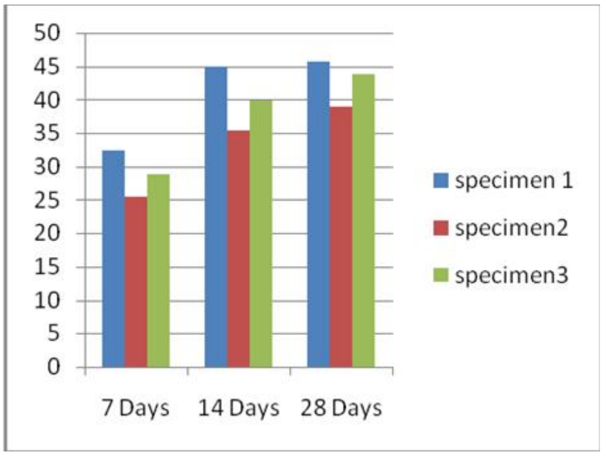
Compressive strengths of basalt sand concrete –30%

DAYS OF CURING	LOAD (kN)			COMPRESSIVE STRENGTH (N/mm²)			AVERAGECOMPRESSIVE STRENGTH (N/mm²)
	1	2	3	1	2	3	
7	720	650	660	32.00	28.88	29.33	30.37
14	996	900	914	44.26	40.00	40.62	41.63
28	950	990	940	42.22	44.00	41.73	42.65



Compressive strengths of basalt sand concrete –40%

DAYS OF CURING	LOAD (kN)			COMPRESSIVE STRENGTH (N/mm²)			AVERAGE COMPRESSIVE STRENGTH (N/mm²)
	1	2	3	1	2	3	
7	730	575	647	32.44	25.55	28.75	30.37
14	1010	796	896	44.88	35.37	39.82	41.63
28	1030	876	985	45.77	38.93	43.77	42.65



CONVENTIONALCONCRETE:-

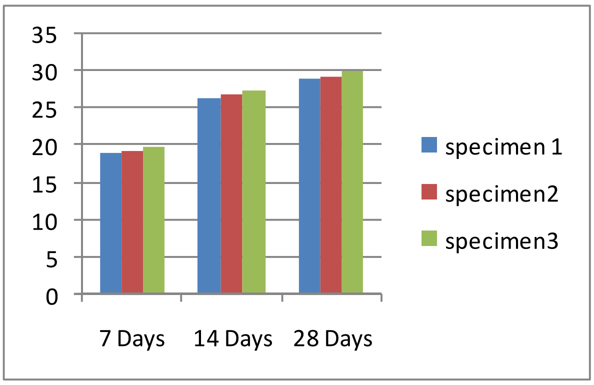
The optimum percentage of replacement of each replaced material is noted materials are mixed with cement, fine aggregate, coarse aggregate in concrete. A new type of conventional concrete is obtained

The following are the optimum contents :

RICEHUSKASH	: 10%
BASALTSAND	: 10%
PALM KERNEL SHELLS	:10%

Compressive strengths of conventional concrete

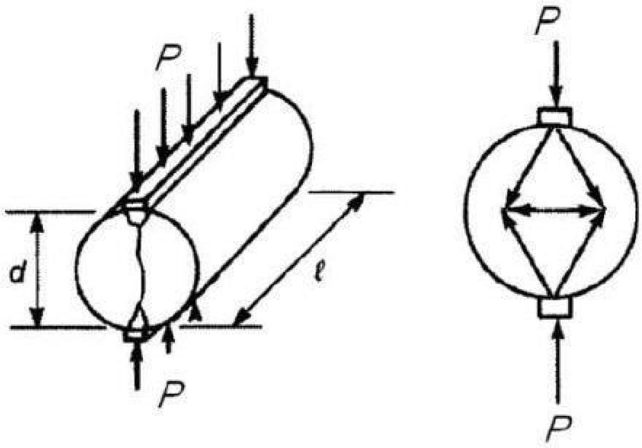
DAYS OF CURING	LOAD (kN)			COMPRESSIVE STRENGTH (N/mm²)			AVERAGE COMPRESSIVE STRENGTH (N/mm²)
	1	2	3	1	2	3	
7	428	434	444	19.00	19.28	19.73	35.16
14	595	605	618	26.44	26.88	27.46	41.60
28	650	660	674	28.88	29.33	30	45.76



COMPRESSIVE STRENGTH OF CONVENTIONAL CONCRETE

SPLIT TENSILE STRENGTHS OF CYLINDERS:-

The tensile strength of concrete is one of the basic and important properties which greatly affect the extent and size of cracking in structures. Moreover, the concrete is very weak in tension due to its brittle nature

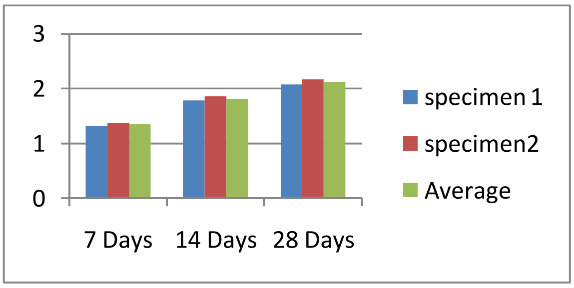


CONVENTIONAL CONCRETE: The optimum percentage of replacement of materials are mixed with cement, fine aggregate, coarse aggregate in concrete. A new type of conventional concrete has been obtained

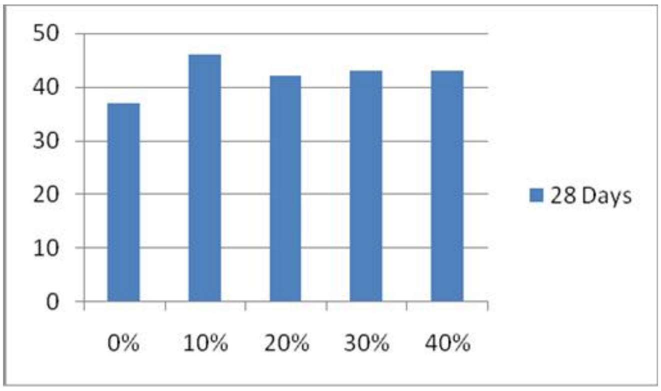
The following are the optimum contents:

RICEHUSKASH : 10%
BASALTSAND : 10%
PALM KERNEL SHELLS :10%

DAYS OF CURING	LOAD(kN)		SPLIT TENSILE STRENGTH (N/mm^2)		AVERAGE SPLIT TENSILE STRENGTH(N/mm^2)
	1	2	1	2	
7	94	98	1.32	1.38	1.35
14	126.9	132.5	1.78	1.863	1.82
28	148	154	2.07	2.16	2.12

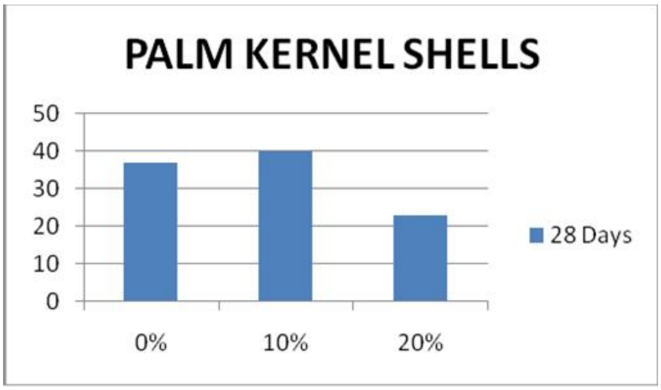


Comparisions:- The following figure shown that comparison of river sand replacement by basalt sand as 10%,20%,30%,40%in concrete.Now the compressive strengths of each replacement proportion had compared with the normal concrete.The following graph clearly shows the variation in compressive strengths of basalt sand concrete and normal concrete:



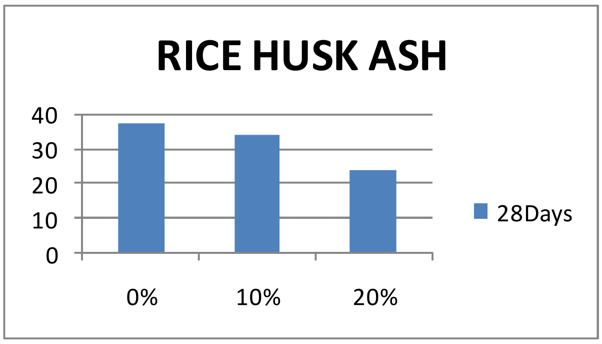
Comparison of Compressive strength of Basalt Sand Concrete

The Palm kernel shells as 10%, 20% replacementfor coarse aggregate in concrete .Now the compressive strengths of each replacement proportion is compared with the normal concrete. The following graph clearly shows the variation in compressive strengths of palm kernel shells concrete and normal concrete



Comparison of Compressive strength of Palm Kernel Shell Concrete

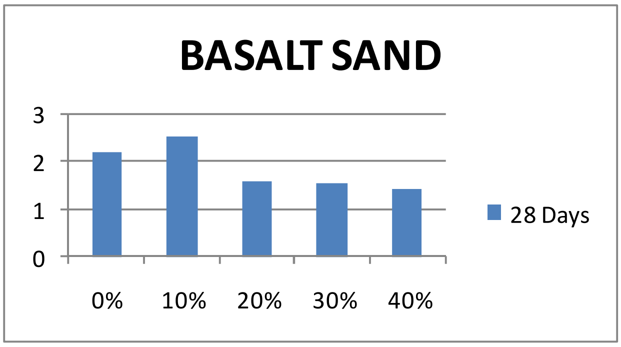
Rice husk ash as 10%, 20% replacement for cement in concrete. Now the compressive strengths of each replacement proportion are compared with the normal concrete. The following graph clearly shows the variation in compressive strengths of Rice husk ash concrete and normal concrete.



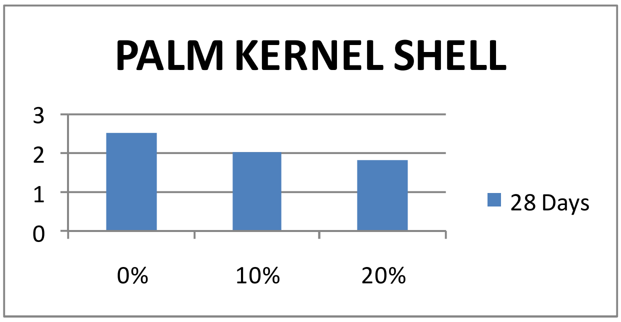
Comparison of Compressive strength of Rice Husk Ash

COMPARISON OF SPLIT TENSILE STRENGTH OF CONCRETE

Basalt sand as 10%,20%,30%,40% replacement for fine aggregate in concrete.Now the splittensile strengths of each replacement proportion is compared with the normal concrete.The following graph clearly shows the variation in split tensile strengths of basalt sand concrete and normal concrete:

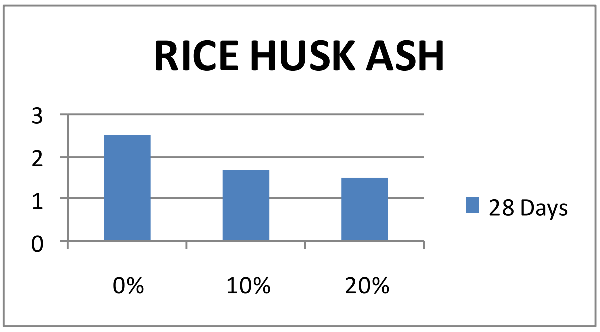


Comparison of Split Tensile strength of Basalt Sand



Comparison of Split Tensile strength of Palm Kernel Shell Concrete

We have already casted Rice husk ash as 10% ,20% replacement proportions in cement in concrete.Now the split tensile strengths of each replacement proportion is compared with the normal concrete. The following graph clearly shows the variation in split tensile strengths of Rice husk ash concrete and normal concrete:



V. CONCLUSIONS

All the experimental knowledge shows that the addition of the economic wastes improves the physical and mechanical properties of concrete. The usage of Rice husk ash in concrete as a replacement for cement can decrease the emission of green-house gases to a larger extent and also it reduces cost of construction. Palm Kernel Shell has good potential to be used as replacement for coarse aggregate as light weight aggregate in concrete.

1. The results gives clear picture that basalt sand can be utilized in concrete mixtures as a good substitute for natural river sand with higher strength at 10% replacement. The percentage of increase in strength with respect to control concrete is 24%. But tensile strength of concrete at 10% had been equal to the normal concrete
2. Based on initial tests performed, Palm shell concrete is found 10% lighter than the conventional concrete
3. The results shown that maximum compressive strength was achieved at 10% of replacement of coarse aggregates by palm shell, which provided equivalent strength as that of the conventional concrete. The percentage of increase in strength with respect to control concrete is 24%.The percentage of increase in strength with respect to control concrete is9.77%
4. Cost of palm shell is found to be 46% lesser than the cost of coarse aggregate. So it is economical by reducing the construction cost
5. According the results of compressive strength, rice husk ash increase the rate of compressive strength from 7 days

to 28 days at 10% of replacement of cement. The percentage of increase in strength with respect to control concrete is4%

6. Moreover with the use of rice husk ash and palm shell, the weight of concrete reduces thus making the concrete lighter which can be used as light weight construction material
7. Conventional concrete prepared by taken optimum percentage of replacement of each materials were tested for compressive strength and attained has 19% reduction in compressive strength when compared to normal concrete but weight has been reduced by 10% of weight and mostly which should be equivalent strength of M25 grade of normal concrete
8. Split tensile strength decreases as we increased the percentage of replacement of various materials when compared to normal concrete
9. By the addition of chemical admixture Latex bonding agent (ACE COAT)in concentration of 1% which helps in bonding and increases resiliency and elasticity of concrete

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