PARTIAL REPLACEMENT OF COARSE AGGREGATE WITH COCONUT SHELL IN CONCRETE

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ABSTRACT

The high cost of conventional construction material affects economy of structure. With increasing concern over the excessive exploitation of natural aggregates, synthetic lightweight aggregate produced from environmental waste is a viable new source of structural aggregate material. The uses of structural grade lightweight concrete reduce considerably the self-load of a structure and permit larger precast units to be handled. Recently in the environmental issues, restrictions of local and natural access or sources and disposal of waste material are gaining great importance. Today, it becomes more difficult to find a natural resource. Use of the waste materials not only helps in getting them utilized in cement, concrete and other construction materials, but also has numerous indirect benefits such as reduction in land fill cost, saving in energy, and protecting environment from possible pollution effect. It also helps in reducing the cost of concrete manufacturing. In the present work, coconut shell as partial replacement for coarse aggregate in concrete is studied. The concrete with ground coconut shell was found to be durable in terms of its resistance in water, acidic, alkaline and salty. Density of coconut shell is in the range of 550 - 650 kg/m3 and these are within the specified limits for lightweight aggregate. The characteristic properties of concrete such as compressive strength, flexural strength, impact resistance, bond strength & split tensile strength using the mix made by replacing coarse aggregate with crushed coconut shell aggregate were reviewed in the present work.

Keywords: Coconut shell, coarse aggregate, light weight concrete.

I.INTRODUCTION

Infrastructure development across the world created demands for construction material. Concrete is the premier civil engineering material. Concrete manufacturing involve consumption of ingredients like cement, aggregates, water & admixtures. Among all the ingredients, aggregates form the major parts. Two billion of aggregate are produced each year in the United States. Production is expected to increase to more than billion tons per year by the year similarly; the consumption of the primary aggregate was 110 million tones in the UK in year 1960 and reached nearly 275 million tones by 2006. Use of natural aggregates in such a rate leads to a question about the preservation of natural aggregates sources. In addition, operation associated with aggregates extraction and processing is the principal causes environmental concern. In light of this in the contemporary civil engineering construction, using alternative materials in place of natural aggregate in concrete production makes concrete as sustainable and environmentally friendly construction material. Coconut shell being a hard and not easily degrade material if crushed to size of sand can be a potential material to substitute sand. At present, coconut shell has also been burnt to produce charcoal and activated carbon for food and carbonated drink and filtering mineral water use. However, the coconut shell is still under utilized in some places. The chemical composition of the coconut shell is similar to wood. It contains 33.61% cellulose, 36.51% lignin, 29.27% and ash at 0.61%.

Utilization of concrete is increasing at a very high rate due to infrastructural development activities in the world concrete is one of the world's most widely used construction material. in addition, concrete is the second most consumed substance in the world after water approximately ten billion tons of concrete is produced every year. Annual production represents one ton for every individual on the planet. There are some negative impacts of more production of concrete like continuous extensive extraction of aggregate from natural resources will lead to its depletion and ecological imbalance. So many researchers are in search of replacing coarse aggregate to make the concrete economical and to extend sustainable development. This environment reason has generated a lot of concern in the infrastructural development world. The role of sugarcane bagasse, wood chips , plastic waste, fabric waste, polyethylene, rice husk ash, rubber tires, vegetable fibers, paper and pulp industry waste, vegetable fibers, paper and pulp industry waste , peanut shell, waste glass, broken bricks are some cases of replacing aggregates in concrete. Therefore, there is a need to explore and to find out suitable and modulus properties.

Coconut are being naturally available in nature and since its shells are non-biodegradable: they can be used readily in concrete, which may fulfil almost all the qualities of original from of concrete. In developed nations, the constructions industries have identified many artificial and natural lightweight aggregates (LWA) that have replaced conventional aggregates thereby reducing the size of structural members. Coconut shell is categorized as light weight aggregate. The coconut shell when dried contains cellulose, lignin and ash in varying percentage. The purpose of this research is to disseminate awareness of using coconut shell as partial replacement of coarse aggregate in concrete and determining its compressive strength.

Concrete is world's most widely used construction material. The utilization of concrete is increasing at a higher rate due to development in infrastructure and construction activities all around the world. However, there are some negative impacts of more production of concrete like continuous extensive extraction of aggregate from natural resources will lead to its depletion and ecological imbalance. Researchers are in search of replacing coarse aggregate to make concrete less expensive and to lead sustainable development. The use of aggregates for construction is one of the most important parts of construction for it well added strength to the concrete. Finding a substitute for the aggregates used today is a task that is worth studying because the quarrying of aggregates from rivers and mountains harms the environment. If a substitute for aggregate can be obtained naturally and the source is abundant and can be regenerated, obtaining the aggregate would deplete its source. The use of coconut by products has been a long-time source of income for some people in the country. The use of coconut shell could be a valuable substitute in the formation of composite material that can be used as a housing construction, such as concrete cubes, beams and cylinders. Coconut is famous as multi-function plant that all parts of its plant can be used for various activities. The use of this agricultural waste due to an assumption is that it can replace the existing material used in commercial product in order to reduce cost or improve mechanical properties of the composite material. Industrialists in most of the coconut producing countries hail the economic, environmental and technological benefits of utilizing coconut farm wastes. On the farmers' side, agricultural residues can be a source of extra income. Studies have shown that burning of agricultural wastes causes air pollution, soil erosion and even a decrease in soil biological activity that can eventually lead to decreased soil fertility. Using agricultural and forest residues for industrial purposes is a much more environment safe and friendly more than any other method of wastes disposal being commonly adopted nowadays. Considered the most useful tree in the world, the coconut palm provides food, drink, clothing, shelter and financial security. Hardly an inch of the coconut palm goes to waste in countries such as the Philip-pines where families rely on the coconut palm for survival and refer to it as the "tree of life". Building materials from agricultural and forest wastes are ideal for socialized or low-cost housing since these are generally cheaper than conventional materials.

The availability of suitable materials is intimately linked to the development of a new product, such as producing a concrete cubes using coconut shells. Generating this product using agricultural waste will introduce alternative construction materials with a low production cost and lessen the social and environmental problems. Modern construction technologies being developed, respond to ecological and social issues of excessive use of raw materials from nature. The main objective of this study will give partial replacement for the aggregates and will determined the ability and benefits to the concrete cubes when substitutes.

The Coconut shells are not commonly used in construction industry and are often dumped as agricultural waste. The aim of this research is to spread awareness of using coconut shell as partial replacement of coarse aggregate in concrete and determining its compressive strength, split tensile strength and density. Until now, industrial by-products and domestic wastes has been utilized in concrete, but the use of agricultural waste in concrete is in its infancy stage. Coconut shell is an agricultural waste. The materials are proportioned by their weights. Tests are as per the specified procedure of Indian Standard Codes.

Concrete is a composite material which composed of aggregates, cement and water. Concrete is used more than any other manmade material in the world. In addition, concrete is the 2nd most consumed substance in the world- behind water. About 7.23 billion tons of concrete is produced every year. Annual production represents one ton for every person on the planet. Production of concrete is increasing due to high growth of infrastructure development and construction activities in the world, Production of concrete demands its constituents like aggregates, cement, water and admixtures. Sources of conventional aggregates occupy the major part of the concrete.

The large scale production of concrete in construction activities using conventional coarse aggregate such as granite immoderately reduces the natural stone deposits and affecting the environment hence causing ecology imbalance. Extraction and processing of aggregates is also a major concern for environment. Therefore consumption of alternative waste material in place of natural aggregate in concrete production not only protects environment but also makes concrete a sustainable and environment friendly construction material. Different waste material like rubber, fly ash, glass, bottom ash, artificial sand etc has been used as alternative for replacing natural aggregates. Apart from the above mention waste material, a few studies shows that agriculture waste coconut shell can also be used as coarse aggregate for concrete.

Lightweight aggregate concrete (LWAC) is an important and versatile material in modern construction. It has gained popularity due to its lower density and superior thermal insulation properties. Many architects, engineers, and contractors recognize the inherent economies and advantages offered by this material, as evidenced by the many impressive lightweight concrete (LWC) structures found throughout the world. Lightweight concrete has strengths comparable to normal concrete; yet is typically 25–35% lighter. Structural LWC offers design flexibility and cost savings due to self-weight reduction, improved seismic structural response, and lower foundation costs. Although commercially available lightweight aggregate has been used widely for manufacture of LWC, more environmental and economic benefits can be achieved if waste materials can be used as lightweight aggregates in concrete.

In developed countries, many natural materials like Pumice, scoria and volcanic debris and manmade materials like expanded blast-furnace slag, vermiculite and clinker are used in construction works as substitutes for natural stone aggregates. In India, commercial use of non-conventional aggregates in concrete construction is not so popular. India is the third largest producer of coconut products in the world. Coconut trees are widely cultivated in the southern states of India. Coconut shells thus get accumulated in the mainland without being degraded for around 100 to 120 years. Disposal of these coconut shells is therefore a serious environmental issue. In this juncture, the study on use of coconut shells as a substitute for coarse aggregates in concrete is gaining importance in terms of possible reduction of waste products in the environment and finding a sustainable alternative for non-renewable natural stone aggregates.

In recent years, researchers have also paid more attention to some agriculture wastes for use as building material in construction. Periwinkle shell was chosen as a substitute for coarse aggregate in concrete and palm kernel shell was used as a replacement for fine aggregate in concrete by some researchers . Certain investigations used crushed, granular coconut and palm kernel shells as substitutes for conventional coarse aggregate and the results of the tests showed that the compressive strength of the concrete decreased as the percentage of the shells increased .The properties of concrete using coconut shell as coarse aggregate were investigated in an experimental study and the study concluded coconut shell concrete can be classified under structural lightweight concrete.

From the research works reviewed above, it can be understand that coconut shells can be successfully used as a substitute for coarse aggregate in concrete. The study presented here is focussing on finding out the optimum range of replacement of coarse aggregate with coconut shells based on its strength properties. The study also aims to find out the advantage of commercially produced coconut shell concrete work in terms of self-weight reduction. Therefore, there is a need to explore and to find out suitable replacement material to substitute the natural stone. In developed nations . the construction industries have identified many artificial and natural light weight aggregates (LWA) that have replaced conventional aggregates there by reducing the size of structural members. Coconut shell is categorized as light weight aggregates the coconut shells when dried contains cellulose, lignin , pentosans and ash in varying percentage. With all in Asia the construction industry is yet to utilize the advantage of light weight concrete in the construction of high- rise structures. Coconut shell (CS) is not commonly practiced in the construction industry. But are often dumped as agricultural wastes . until now. Industries by products and domestic wastes have been utilized in concrete , but the utilization of agricultural waste in concrete is in its early childhood phase. Coconut shell is an agricultural waste. The concrete with ground coconut shell was found to be durable in terms of its resistance in water, acidic , alkaline and salty.

Coconut shell being a hard and not easily degrade material if crushed to size of sand can be a potential material to substitute sand at present, coconut shell has also been burnt to produse charcoal and activated carbon for food and carbonated drinks and filtering mineral water use. However, the coconut shell is still under-utilized in some partial replacement of coarse aggregate in concrete and determining its compressive strength.

1.4. OBJECTIVES

• To compare the compressive strength between conventional concrete and replaced concrete.

• To reduce the aggregate content by partially replacing it with coconut shell to increase the compressive strength and to make it light in weight.

• To increase the workability of concrete.

II.LITERATURE REVIEW

J.P. RIES (2011): studied that Lightweight aggregate (LWA) plays important role in today's move towards sustainable concrete, Lightweight aggregates contributes to sustainable development by lowering transportation requirements, optimizing structural efficiency that results in a reduction in the amount of overall building material being used, conserving energy, Reducing labor demands and increasing the survive life of structural concrete.

AMARNATH YERRMALLA (2012): et al studied the strength of coconut shells(CS) replacement and different and study the transport properties of concrete with CS as coarse aggregate replacement. They concluded that a. Increase in CS percentage decreased densities of the concrete. b. With CS percentage increased the 7 days strength gain also increased with corresponding 28 days curing strength.

VISHWAS P. KULKARNI (2013): studied that Aggregates provide volume at low cost, comprising 66 percent to 78 percent of the concrete. Conventional coarse aggregate namely gravel and fine aggregate is sand in concrete will be used as control. While natural material is coconut shell as course aggregate will be investigate to replace the aggregate in concrete.

The researcher suggested that one of the alternatives for coarse aggregate is coconut shell. It is one of the most common agricultural solid wastes in many tropical countries. Density of coconut shell concrete of the typical mixes ranged from 1930 kg/cum to 1970 kg/cum

There was researched on the coconut shell use as aggregate in the study which showed that with global economic recession coupled with the market inflator trends. The average compressive strength for concrete cubes with coconut shell 15.6 N/mm2 for 28 day It was studied studied the compressive strength, split tensile strength, water absorption and sorption for different coconut shell replaced concrete. By replacement of coconut shells in place of aggregates, 10% &20% replacement will have been decreased marginally the strength properties of concrete compared to the normal concrete.

ANAND RAMESH: The coconut shell is a material which can be a substitute for coarse aggregate. Coconut shell concrete has better workability because of the smooth surface on one side of the shell. The impact resistance of coconut shell concrete is high when compared with conventional concrete [7]. Moisture retaining and water absorbing capacity of coconut shell are more compared to conventional aggregate. Using alternative material in place of natural aggregate in concrete production makes concrete as sustainable and environment friendly Construction material.

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III.MATERIALS

ORDINARY PORTLAND CEMENT(OPC)

Ordinary Portland cement (OPC) manufactured in the form of different grades, the most common in India being Grade- 33 (IS 269: 1989), Grade – 43 (IS 8112:1989) and Grade -53 (IS 1226: 1987). OPC is manufactured by burning siliceous materials like limestone at 1400 degree Celsius and thereafter grinding it with gypsum.

Ordinary Portland cement – Grade 53; have been certified with IS 8112:1989 standards, grade 53 is known in the market for their longer shelf life, fitness, unbeatable consistency and high strength. Hence it is used for constructing bigger structures like building foundations, bridges and structures designed to withstand heavy pressure.

As such, Ordinary Portland Cement is used for quite a wide range of applications. Some of the ordinary Portland applications are in pre-stressed. Dry lean mixes, durable pre-cast concrete and ready mixes for general purposes. The chemical components of ordinary Portland cement are magnesium (Mg), Alumina (Al203). Silica (Sio2), Iron (Fe203) and Sulphurtrioxide (SO3). Some of the big companies involved in OPC manufacture are Tata chemicals, Ultra-tech cement and ACC cement. Ordinary Portland cement is in great demand in India and will continue to be used in India infrastructural up gradation and other constructions.

3.1.2 COCONUT SHELL

Coconut shells used in the study are brought from local temple. The coconut shells are sundried for five days before using it as an aggregate. The cleaning of coconut shell is carried with the help of sand paper, the smaller extractions on the outer face of coconut is cleaned with the help of water. The outer shell is then broken in smaller parts up to 20 mm. The broking of coconut shell is done with the help of 30 kg hammer. Then the broken pieces are passed through IS 20 mm sieve and pieces are retained on a IS 16mm sieve are used.

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3.1.3 Sand [Fine Aggregate]

Fine aggregate / natural sand is an accumulation of grains of mineral matter derived from the disintegration of rocks. It is distinguished from grave lonely by the size of the grains or particles. But it is distinct from clays which contain organic materials. Sands that have been sorted out and separated from the organic material by the action of currents of water or by winds across arid lands are generally quite uniform in size of grains. Usually commercial sand is obtained from river beds or from sand dunes originally formed by the action of winds. The most commercially used are silica sands, often above 98% pure. Beach sands usually have smooth, spherical too void particles from the abrasive action of waves and tides and are free of organic matter. The white beach sands are largely silica but may also be of zircon, monazite garnet, and other minerals. Sand is used for making mortar and concrete and for also used for polishing and sandblasting. Sands containing a little clay are used for making molds in foundries.

Slump from say 5 cm to about 18-20 cm without addition of water. When used to achieve reduction in mixing water they can reduce water up to 15-20% and hence decrease W/C ratio by same amount. This results in increase in strength and other properties like density, water tightness. Where thin sections are to be cast super plasticizer can increase workability to pump able level and almost no compaction is required. This helps in avoiding honeycombing. The permeability of concrete is a guide to its durability. Gross porosity is usually due to continuous passage in the concrete due to poor compaction or cracks which can be minimized by the use of super plasticizer, the incorporation of which provides increased workability maintaining low w/c ratio. It is reported that Coefficient of permeability of cement paste reduces considerably with the reduction in w/c ratio

3.1.4 Coarse aggregate

The coarse aggregate is the aggregate which has large particle size ; coarse aggregate is defined as the aggregate containing a high proportion of particles retained on a 5mm(0.197) in sieve in the US and elsewhere a 4.75mm (0.187) in sieve is used as the limit . According to IS 3839(1970) machine passing through 20mm sieve and retained on 12.5mm sieve and chips passing 12.5mm sieve and retained on 10mm sieve were used as coarse aggregate throughout the work.

3.1.5 Water

Water fit for drinking is generally considered fit for making concrete. Water should be free from acids, oils, alkalis, vegetables or other organic Impurities. Soft waters also produce weaker concrete. Water has two functions in a concrete mix. Firstly, it reacts chemically with the cement to form a cement paste in which the inert aggregates are held in suspension until the cement paste has hardened. Secondly, it serves as a vehicle or lubricant in the mixture of fine aggregates.

IV.METHODOLOGY

The concrete mix design was carried out for the present work. The concrete mix design is a process of selecting the suitable ingredient of concrete and determining their most optimum proportions economically. The approximate value for the coarse aggregate volumes are given in IS 10262-2009 for the water cement ratio. For more workable concrete that can flow around any congested reinforcement bars, it may be desired to reduce the coarse aggregate content.

4.1 COLLECTION OF MATERIALS

For the production of this concrete. The constituent materials are cement, fine aggregate, coarse aggregate, coconut shell and water. To get better workability and strength, the materials used should have better quality to maintain the safety of any structure, provisions are provided as per IS 456-2000.

4.1.1. Cement

In this experiment work cement used is ordinary Portland cement with 53 grade of cement. We will find the various properties by testing the cement such as specific gravity test, normal consistency test setting time test etc.

4.1.2. Fine aggregate

River sand was used as the fine aggregate, conforming to Zone-2. It has the various properties we will find by te sting the sand such as specific gravity, water content, The fine aggregatewas dried for 24 hours and made free from dust particles. Sieved through the 4.75mm. Stored in the lab where there is no moisture.

4.1.3. Coarse aggregate

Coarse aggregate of size up to 20 mm used in this experimental work. they are various physical properties of coarse aggregate those are specific gravity, water absorption and impact value.

4.1.4 Coconut shell

Coconut shell used in the study are bought from local temple and market. The coconut shell is sundried for five days before using it as an aggregate. The outer shell is then broken in smaller parts. The broking of coconut shell is done with the help of 30 kg hammer. Then the broken pieces are passed through 12.5mm sieve and pieces retained on 10 mm sieve are used. The physical and mechanical properties of coconut shell are mentioned.

4.2 TESTING AND PROPERTIES OF MATERIALS

4.2.1. Tests on cement

a) Standard consistency of cement

The standard consistency of a cement paste is defined as that consistency which will permit the vacate plunger to penetrate to a point 5to7 mm from the bottom of the vicat mould. For finding out initial setting time, final setting time, soundness of cement and compressive strength of cement, it is necessary to fix the quantity of water to be mixed in cement in each case. the experiment is intended to find out the quantity of water to be mixed for a given cement to give a cement paste of normal consistency and can be done with the help of vacate apparatus. When water is added to the cement, the paste starts stiffening and gain strength. During the process of stiffening the following phases of action takes place

1. Setting means stiffening of cement paste are loosing of plasticity.

2. Hardening means gaining of strength.

Procedure:

1. Take 400gm of cement, which passes through 90mic sieve to prepare on mould.

2. Prepare a cement paste with a measured quantity of water. The time of mixing is in between 3to5 minutes and shall be completed before any signs of setting become visible. The gauging shall be counted from the time of adding water to the dry cement until commencing to fill the mould.

3. Fill the vicat mould resting on a non-porous plate with this paste. After completely filling the mould, smooth off the surface and making it level. The mould may be slightly shaken to expel the air.

4. Place the test block in the mould together with non-porous resting plate under the rod attached with the plunger.

5. Lower the plunger gently to touch the surface of the test block and quickly release, allowing it to sink

into the paste. The operation should be carried out immediately after filling the mould at room temperature

6. Trail test pastes are prepared with varying percentages of water from 25% and 35% with increment Of 2% until the amount of water necessary for making up the standard consistency is attend.

Observations:

Table 3.1: Standard consistency values

Sl.No.	Quantity of Cement by weight	% of water Added	Volume of Water in CC	Reading on Vicat apparatus
1	300 gms	24	72 ml	35
2	300 gms	28	84 ml	20
3	300 gms	32	96 ml	5

Result: Normal consistency of the cement paste=32%

b) Fineness of Cement:

The fineness of cement has an important bearing on the rate of hydration and hence on the rate of gain of strength and also on the rate of evolution of heat. Finer cement offers a greater surface area for hydration and hence the faster and greater the development of strength. Increase in fineness of cement is also found to increase the drying shrinkage of concrete. Fineness of cement is tested either by sieving or by determination of specific surface by air-permeability apparatus. Specific surface is the total surface area of all the particles in one gram of cement.

i. Weigh accurately 100 g of cement and place it on a standard 90 micron IS sieve.

ii. Break down any air-set lumps in the cement sample with fingers.

iii. Continuously sieve the sample giving circular and vertical motion for a period of 15 minutes.

iv. Weigh the residue left on the sieve. As per IS code the percentage residue should not exceed 10%.

Percentage of fineness % = (W1-W2) / W1 * 100

W1 = Total weight of cement

W2 = Weight of residue

Observations:

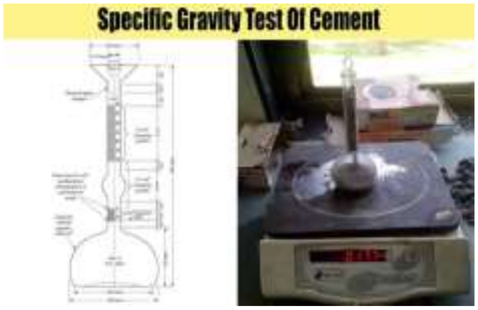
Table: 3.2 fineness values of cement

S.No	Weight of sample taken(g)	weight of residue(g)	Fineness (%)
1.	100	2.8	97.2
2.	100	3.3	96.7
3.	100	2.9	97

Result: Fineness of given sample of cement =97%

c) Specific Gravity of Cement:

Specific gravity is defined as the ratio between weight of a given volume of material and weight of an equal volume of water. To determine the specific gravity of cement, kerosene is used which does not react with cement.



i. Clean and dry the specific gravity bottle and weigh it with the stopper (W1).

ii. Fill the specific gravity bottle with cement sample at least half of the bottle and weigh with stopper (W2).

iii. Fill the specific gravity bottle containing the cement, with kerosene (free of water) placing the stopper and weigh it (W3).

iv. While doing the above do not allow any air bubbles to remain in the specific gravity bottle.

v. After weighing the bottle, the bottle shall be cleaned and dried again.

vi. Then fill it with fresh kerosene and weigh it with stopper (W4).

vii. Remove the kerosene from the bottle and fill it with full of water and weigh it with stopper (W5)

Table 3.3: Specific gravity values of cement

Description of item	Values in gms
Weight of empty bottle W_1 g	32.44
Weight of bottle + Cement W_2 g	61.82
Weight of bottle + Cement + Kerosene W_3 g	94.2
Weight of bottle + Full Kerosene W_4 g	73.33
Weight of bottle + Full Water W_5 g	83.63

Specific gravity of Kerosene Sk = (W4 - W1) / (W5 - W1)

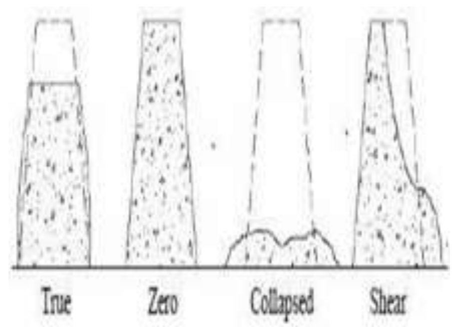
= (73.33-32.44)/ (83.63-32.44) =0.8

Specific gravity of Cement Sc = (W2 - W1) / ((W4 - W1)-(W3-W2))*Sk

= (61.82-32.44)/((73.33-32.44)-(94.2-61.82))*0.8

= 2.864

TYPES OF SLUMPS



4.3 PROCEDURE

Compression testing has been performed for 0%, 10%, 25% and 50% replacement of stone chips with CS. It has been observed that the compressive strength of the concrete decreases as the percentage of the coconut shells increase in the concrete mixer as presented in Table 2. It is also observed that the concrete compressive strength of the cylinder specimens increases with the increasing curing days. According to ACI, a concrete is considered structural lightweight aggregate concrete when made with lightweight aggregates conforming to ASTM C 330 and has a compressive strength in excess of 2,500 psi (17.25 MPa) at 28 days of age. From Figure 7 it can be observed that the compressive strength (at 28 days and 90 days) of concrete produced with 10% and 25% replacement of stone chips with coconut shells is approximately 90% and 65% of the concrete produced with 100% stone chips coarse aggregate and therefore, satisfies the strength requirements for lightweight concrete. An examination of the failure surfaces showed breakage of the CS aggregate, indicating that the individual shell strength had a strong influence on the resultant concrete strength.

The batches were prepared and cured accordingly:

1. Concrete cubes were prepared with replacements of 0,5,10,15,20% of Coarse aggregate with coconut shell

2. The slump test was carried out following IS: 1199-1959. Place the mixed concrete in a clean slump cone 4 layer each approximately one fourth of the weight of mould after applying a thin coat of oil to the inner surface of cone. Tamping each layer 25 times with tamping rod uniformly throughout the surface of the mould. Smooth the surface by using straight edge after

the cone is completely filled by the concrete. Lift the cone vertically by holding the lifting handles and measure the slump (i.e.) the average height of falling concrete.

3. Repeat the same procedure for different aggregate replacements.

4. The moulds used were 150mmx150mmx150mm rigid steel forms. The moulds were filled with 3 lifts of freshly mixed concrete, tamping each lift 25 times with tamping rod and tamping each lift lightly with mallet 10-15 times. The excess concrete was struck off and finished to a smooth surface with steel or wooden trowel. The moulded cubes were left covered with room temperature for about 24 hours after which the moulds were removed under then the cubes were transferred to curing tank at a temperature of 26oc and relative humidity of approximately 95- 100%.

5. The cubes were used to test for compressive strength. Once set of 3 cubes were tested after 7 days and another set of 3 cubes were tested after 28 days.

V.RESULTS AND DISCUSSION

5.1 COMPRESSION TEST

Testing hardened concrete plays an important role in controlling and conforming the quality of cement concrete work. The main factor in favour of the use of concrete in structures is its compressive strength. One of the important properties of the hardened concrete is its strength which represents its ability to resist forces. The compressive strength of the concrete is considered to be the most important and is often taken as an index of the overall quality of concrete. The compressive strength of concrete is defined as the load which causes the failure of specimen per unit cross section on compression under given rate of loading.

Apparatus: Cube moulds 150mm size, weighing machine, tamping rod sand compression tesing machine

Procedure:

1. Take three cube moulds for each mix. Assemble the mould with base plate so that it is rigidly held together

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2. Clean the inside of the mould and see that joints (at the edges) are perfectly tight.

3. Pour properly mixed concrete for the given mix to the cube moulds

4. Compaction by needle vibrator or will be preferred. If vibrator is not available, hand compaction is to be done by placing concrete in three layers; each layer be compacted with the help of standard temping rod by means of 25 blows.

5. Level the concrete at the top of the mould by means of trowel and give proper identification mark of the specimen.

6. Keep the cubes in laboratory for 24 hours.

7. After 24 hours, dismantle the plates of cube mould and take out the hardened concrete cubes carefully so that edges specimens are not damaged.

8. Immerse the cubes in curing tank filled with water. Keep it for curing up to 28 days.

9. Test the cubes after 7, 14 and 28 days of curing to find the compressive strength.

10. Tabulate Compressive strength for each cube and calculate average value for each

5.2 TESTING PROCEDURE:

The molded cubes are removed from curing tank after the specified curing. Excess water is wiped out on the specimen is dried. Dimensions of the specimens are measured to the nearest 0.2 meter. The specimens are taken for the testing at compressive testing machine is cleaned and the specimens are placed in such a manner that the load is applied to the opposite sides of the cube cast uniformly. The specimen is aligned centrally on the base plate of the machine and the movable portion is rotated by hand so that it touches the top surface of the specimen. The load is applied gradually without shock and continuously at the rate of 140 kg/cm3/min till it fails. The maximum load is recorded and any usual features in type of failure are noted. A min of 3 specimens are tested at selected age. If any strength is varied by more than 15% of average strength results of such specimen should be rejected. Average of three specimens gives the crushing strength of concrete.

During the compressive strength, the load P is collected and the strength was calculated

5.3 TEST RESULTS

Table no.5.1 Compressive strength details for 7 days

S.NO	Percentage of coconut shell	Compressive strength for 7 days (N/mm2)
1	0	15.50
2	5	14.40
3	10	13.30
4	20	12.30
5	30	11.45

Table no.5.2. compressive strength for 14 days

S. NO	Percentage of Coconut shell	Compressive strength for 14 days (N/mm2)
1	0	18.56
2	5	18.20
3	10	17.30
4	20	16.40
5	30	15.80

Table no.5.3. compressive strength for 28 days

S NO	Percentage of Coconut Shell	Compressive strength for 28 days (N/mm2)
1	0	22.30
2	5	20.45
3	10	20.10
4	20	18.70
5	30	17.90

VI.CONCLUSION

The experiments were performed to replaced CS as coarse aggregate in concrete of M 20 grade. The check the effect of size of Cs in concrete. I will used the various sizes of 8 mm,10mm and 12.5 mm in replaced 10% of CS. after 10% CS and added coerfibre in concrete on different temperature. The following conclusions were obtain base on results.

1) The addition of Cs increases as decrease the workability.

2) The percentage of Cs increase as deceased compressive strength, split tensile strength and flexural strength as compared to conventional concrete.

3) The replacement of CS up to 20% as to good result of compressive strength as compared to conventional concrete.

4) The various sizes (8 mm, 10 mm and 12.5 mm) of 10% replace Cs in concrete .the sizes of Cs increase as decrease the split tensile strength, flexural strength and compressive strength.

5) Replacement of 10% CS and added fiber in concrete. After the replacement of 10% CS and added fiber in concrete on different high temperature. By observing that replaced cs and added fiber in concrete to increase flexural test, split tensile strength and compression test as compared to Cs and added fiber on different high temperature.

6) The result shows compressive strength of percentage replaced of Cs concrete in H2SO4 and Hcl solution curing are partially greater then the normal water curing.

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