



STUDY OF BEHAVIOUR CONCRETE STRUCTURE BY USING COCONUT SHELL

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Abstract

Now days, there is lots of development in construction field. So, there is need for light weight aggregate and economical aggregate in construction field. The cost of building materials are increases day by day. Therefore there is a need for research on suitable material without affecting the strength of concrete structure. The main aim of this project is to checks strength of structure by using coconut shell as an aggregate. The coconut shell is a waste material and which is easily available as well as economical in cost. Here, in this project we have analyzing compressive strength by using M25 grade concrete (1:1.5:3) with 0%, 10%, 20%, 30%, 40%, 50%, 100% partial replacement of coconut shell.

Keywords: coconut shell used in concrete, compressive strength of coconut shell, Coconut shell concrete, Waste materials used in concrete.

I Introduction:

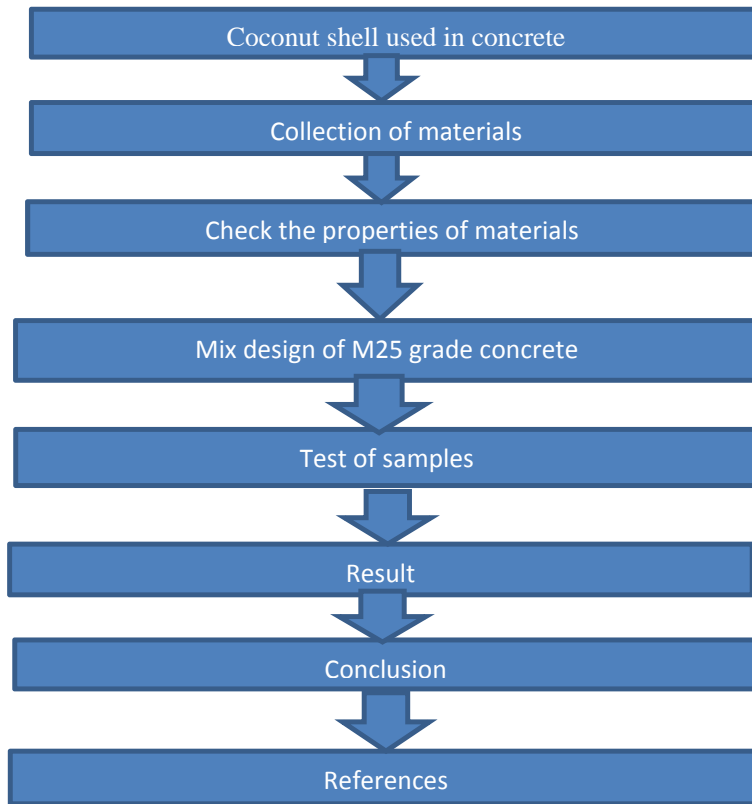
With the development of world, the construction field also developed. Now a day different types

of waste materials are used in the construction. In developed countries many industries companies they have identify many natural light weight aggregate. The use of waste material is important role in reduction of cost of construction and results in solid waste management. In this paper coconut shell waste material is used in the construction. Concrete is a composite material composed of coarse aggregate. Coconut shell is one of the waste material can be used as aggregate in concrete and which is easily available in all countries like India, Asia, Africa, USA etc. The coconut shell is light weight aggregate and more suitable for construction because toughness of coconut shell is high and which is easily available.

II Objective:

1. To find economical materials for high cost construction.
2. To prepare lightweight concrete structure by using coconut shell as course aggregate.
3. To reduce the solid waste by using coconut shell as a course aggregate.

Methodology:



Properties of coconut shell:-

Sr.no.	PHYSICAL PROPERTY	RESULT
1.	Maximum Size (mm)	20
2.	Fineness modulus of coconut shell	6.48
3.	Specific Gravity of coconut shell	1.56
4.	Bulk Density of coconut shell(kg/m ³)	510-600
5.	Moisture Content (%)	4.2
6.	Aggregate Crushing Value (%)	2.49
7.	Aggregate Impact Value (%)	8.55

Mix Design of M25 grade concrete:

Factor to be considered for mix design:

1. Type of cement: OPC 53 Grade conforming as per IS 12269
2. Grade of concrete: M25
3. Maximum water-cement ratio: 0.50 from IS 456:2000(table5).
4. Minimum cement content: 300 kg/m³ (IS 456:2000)
4. Maximum nominal size of aggregate: 20 mm

5. Degree of workability: medium.
6. Degree of supervision: Good
7. Workability: adequate workability
8. Exposure condition: Moderate (For Reinforced Concrete)
9. Type of aggregate: Crushed Angular Aggregates

Calculations of different samples:

The different quantities of coconut shell is analysing by the help of standard cube, in which mixing proportion of concrete is 1:1.5:3.

Size of standard cube =150mmX150mmX150mm.

Each quantity of coconut shell is tested in 5 different cubes.

Total nos. of cubes=35

A) when 0% CS and 100% CA:

cubes =5

volume of cubes=(0.15 X 0.15 X 0.15)⁵=0.01687m³

Assume additional mixing is 50%

Quantity of mixing= 0.01687+(0.01687 X 5)=0.025305 m³

Volume of cement=

(0.025305)/(1+1.5+3)=4.6 X 10⁻³ m³

Weight of cement=4.6 X 10⁻³ X 1428 =6.5688Kg

Cement =6.5=7kg
 Sand=1.5 X 7=10.5 kg
 Aggregate=7 X 3=21kg

B) when 10% CS and 90%CA:
 Cubes =5
 Weight of Cement =7kg
 Weight of Sand=1.5 X 7=10.5 kg
 Weight of CS=21 X 0.10=2.1kg
 weight of Aggregate=21-2.1=19.1kg

C) when 20% CS and 80%CA:
 Cubes =5
 Weight of Cement =7kg
 Weight of Sand=1.5 X 7=10.5 kg
 Weight of CS=21 X 0.20=4.2kg
 Weight of Aggregate=21-4.2=16.8kg

D) when 30% CS and 70%CA:
 cubes =5
 Weight of Cement =7kg
 Weight of Sand=1.5 X 7=10.5 kg
 Weight of CS=21 X 0.30=6.3kg
 Weight of Aggregate=21-6.3=14.7kg

E) when 40% CS and 60%CA:
 cubes =5
 Weight of Cement =7kg
 Weight of Sand=1.5 X 7=10.5 kg
 Weight of CS=21 X 0.4=8.4kg
 Weight of Aggregate=21-8.4=12.6kg

F) when 50% CS and 50%CA:
 cubes =5
 Weight of Cement =7kg
 Weight of Sand=1.5 X 7=10.5 kg
 Weight of CS=21 X 0.5=10.5kg
 Weight of Aggregate=21-10.5=10.5kg

G) when 100% CS and 0%CA:
 cubes=5
 Weight of Cement =7kg
 Weight of Sand=1.5 X 7=10.5 kg
 Weight of CS=21 X 1=21kg
 here quantity of CS is maximum.

Compressive Strength Results:
 CS=coconut shell
 CA=course aggregate

Sr. no.	Samplers	Compressive Strength in Mpa		
		7 days	14 days	28 days
1.	0%CS+100%CA	14.57	17.80	21.31
2.	10%CS+90%CA	14.51	17.78	21.28
3.	20%CS+80%CA	14.42	17.70	21.13
4.	30%CS+70%CA	13.22	16.66	20.30
5.	40%CS+60%CA	13.17	16.52	20.02
6.	50%CS+50%CA	13.11	16.38	19.68
7.	100%CS+0%CA	8.23	11.06	13.94

Advantages

1. Producing economic concrete by reducing the cost of material.
2. Coconut shells are more resistant towards crushing, impact and abrasion.
3. Useful for low cost housing and partition wall.
4. Place where availability of coconut shell is in abundance.
5. Production of light weight concrete.

Disadvantages

1. Coconut shell cannot use in large proportion in concrete.
2. Coconut shell not useful for high rise building.

Conclusion

From this experiment, the combination of coconut shell gives good strength by using quantities of 10% to 30% CS. Also, using the combination of coconut shell as aggregate in concrete can reduce the cost of material. For economical purpose, the coconut shell is suitable for course aggregate.

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