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Review Paper on Study of Concrete by using Coconut Shell and Paper Sludge with Partial Replacement

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Abstract: ***In this construction environment, the coarse aggregate, cement and sand are the main ingredients of concrete. The building must be strong enough and materials should be available at reasonable rates. The coconut shell can be a substitute for aggregates. Cement causes environmental problems by release of CO_2. Paper sludge contains low calcium and minimum amount of silica. This can be very useful in replacing cement. The cost of construction with conventional materials are high. This paper reviews various research papers reviewed by authors. The parameters are tested for compressive strength for 7, 14 & 28 days. The use of coconut shell as partial replacement for conventional aggregate and paper sludge as cement should be encouraged as an environmental protection and construction cost reduction measure.***

Keywords: ***Concrete, coconut shell, compressive strength, paper sludge, construction cost***

I. INTRODUCTION

Concrete is widely used construction material and the use of concrete is in increasing rate due to production in infrastructure and construction activities in all around the world. At the present time there is a huge growth in construction work. Too many road network are developing and also infrastructures for residential projects and commercial project are developing, due to this high development of construction project demand of construction material is also increased. Researchers throughout the world have been investigating ways of replacing cement and aggregate to make construction sustainable and less expensive. Research addressing environmental and sustainability issues in construction has generated lot of interest in the world.

Coconut shell is one of the waste material that can also be used as aggregate in concrete due to some reasons like large scale cultivation of coconut in coastal region of India including Kerala, Andhra Pradesh, Goa, etc. due to tough made tissue, shell is not decomposed easily and remain as solid waste for years. Until recently, most municipal and industrial waste has been disposed of in landfills. However, the increasing refusal of communities to have landfills nearby, as well as the increased pressure from environmental agencies to require proper waste management is creating the need for alternative final disposal consistent with environmental needs at a rational cost. These materials possess problems of disposal, health hazards and aesthetic problem. Paper fibers can be recycled only a limited number of times before they become too short or weak to make high quality paper. It means that the broken, low- quality paper fibers are separated out to become waste sludge.

II. LITERATURE REVIEW

A. S. Andavan, N. Ravi Sreekar et al (2018)

In this paper, the replacement of coconut shell as coarse combination in concrete mixture has been discussed. The authors of this paper discussed about replacing coconut shell for coarse aggregate. They used three different grades such as M20, M35 and M50 concrete mix. 0%, 10%, 20%, 30% and 40% were replaced and 7 and 28 days test were conducted.

B. Maninder Kaur, Manpreet Kaur (2012)

In this paper, the authors concluded that coconut shell are more suitable as low strength giving lightweight aggregate when used to replace common coarse aggregate in concrete production. A research conducted on the comparative cost and strength characteristics of concrete by using the ratio 0%, 25%, 50%, 75% and 100% with mix ratio (1:1:2 and 1:2:4).

C. Jawahar Singh, Premit Kumar Patil (2016)

In this paper, reported that concrete were produced by mixing adequate amount of the waste paper sludge and water, and they compares slump value. In this paper concluded that compressive, splitting tensile and flexural strength increased up to 10% addition of waste paper sludge and future increase in waste paper sludge reduces the strength gradually. The cement had been replaced by waste paper sludge accordingly in the range of 5% to 20% by weight.

D. Ajay Lone, Aniket Deshmukh et al

In this paper, the utilization of coconut shell as a replacement for course aggregate had been discussed based on the obtained experimental results. Coconut shell concrete with 25% and 50% course aggregate replacement were prepared with constant water. For all mix, compressive strength determine at 7, 14 and 28 days.

E. Yogesh Narayan Sonawane et al (2013)

In this paper, concrete obtained by using coconut shell aggregate satisfied the minimum necessity of concrete the coconut shell has superior workability because of the smooth surface on one side of the coconut shell. Moisture retaining and water absorbing capacity of the coconut shell is more as compared to conventional aggregate. Therefore, coconut shell can be used where lightweight concrete is required, proper bonding between coconut shell and cement is not possible because of surface area of coconut shell aggregate. In future, we can increase strength of coconut shell concrete by adding admixtures.

F. Dewanshu Ahlawat, L. G. Kalurkar

In this study, M20 grade of concrete was produced by replacing coconut shell. The compressive strength of concrete reduced as the percentage replacement increased concrete produced by 2.5%, 5%, 7.5%, 10% replacement attained 28 days compressive strength respectively.

G. Parag S. Kambli, Sandhya R. Mathapati (2014)

A research effort had been done to match need for safe and economy disposal of waste material. The current concrete construction practices though unsustainable because, it is consuming enormous quantity of stone. Experiments had been conducted on waste material i.e, for rubber tyre, E-waste, coconut shell, blast furnace slag, waste plastic, demolished concrete constituents, waste water etc.

H. Daniel Yaw Osei (2013)

In this study, the density and strength characteristics of concrete were investigated by volume replaced by 20%, 30%, 40%, 50% and 100% of crushed granite with coconut shell. It is concluded that increase in percentage replacement by coconut shell reduced the strength and density of concrete. Coconut shell can be used as partial replacement for crushed granite or further aggregate in reinforced concrete construction.

I. T. Subramani, V. Angappan (2015)

In this paper, an experimental investigation had been carried out on two optimized mix for papercrete bricks depending upon the compressive strength, unit weight and water absorption. The potential use of waste paper for producing a low- cost and light composite bricks as building material. These alternative bricks were made with papercrete. In this paper, the replacement of cement 20%, 30% and 50% has been concluded.

J. Seyyedeh Fatemeh Seyyedalipour, Daryosh Yousefi Kebria et al (2014)

In this paper, cement had been replaced by fly ash and hypo sludge accordingly in the range of 0% (Without flash ash and hypo sludge), 10%, 20%, 30% and 40% by weight of cement for M25 and M40 mix. Concrete mixtures were produced, tested and compare in terms of modulus of elasticity with conventional concrete for 56 days water curing. In this paper, it was concluded that the productive use of waste material represents a way of solving some problem of solid waste management.

Table 1 shows percentage of replacement of materials such as coconut shell as coarse aggregate and paper sludge as cement:

Table 1

Paper Number	Material Replaced		Percentage of Replacement (%)
	Aggregate	Cement	
1	Coconut Shell	-	0, 10, 20, 30, 40
2	Coconut Shell	-	0, 25, 50, 75, 100
3	-	Paper Sludge	5 to 10
4	Coconut Shell	-	25, 50
5	Coconut Shell	-	0, 25, 50, 100
6	Coconut Shell	-	2.5, 5, 7.5, 10
7	Coconut Shell	-	0, 10, 20, 30, 40
8	Coconut Shell	-	20, 30, 40, 50, 100
9	-	Paper Sludge	20, 30, 50
10	-	Paper Sludge	10, 20, 30, 40

III. CONCLUSION

Experimental investigation is based on test conducted for workability, compressive strength, split tensile strengths, flexural strengths. Coconut shell can be used where light weight concrete is required. Proper bonding between coconut shell and cement is not possible, because of surface area of coconut shell aggregate. Coconut shell is used as limited replacement for the standard coarse aggregate within the construction of concrete.

A. The density of concrete will be reduced as the replacement material increases.
B. Coconut shell can be used as partial replacement of coarse aggregate or other conventional aggregate in reinforced concrete construction.
C. It can concluded that, paper sludge can be a good alternate for conventional binding material in concrete and also it reduced the harmful effect from cement industries.
D. The productive use of waste material represents a way of solving some problems of solid waste management.
E. Durability studies on coconut shell concrete should be carried out to assess its behaviour in aggressive environment.
F. From above literature review, it was concluded that using Coconut shell and Paper sludge as partial replacement in concrete would be economical.
G. Micro structural and morphological studies are essential to gain a better understanding of the effect of industrial waste in construction materials.

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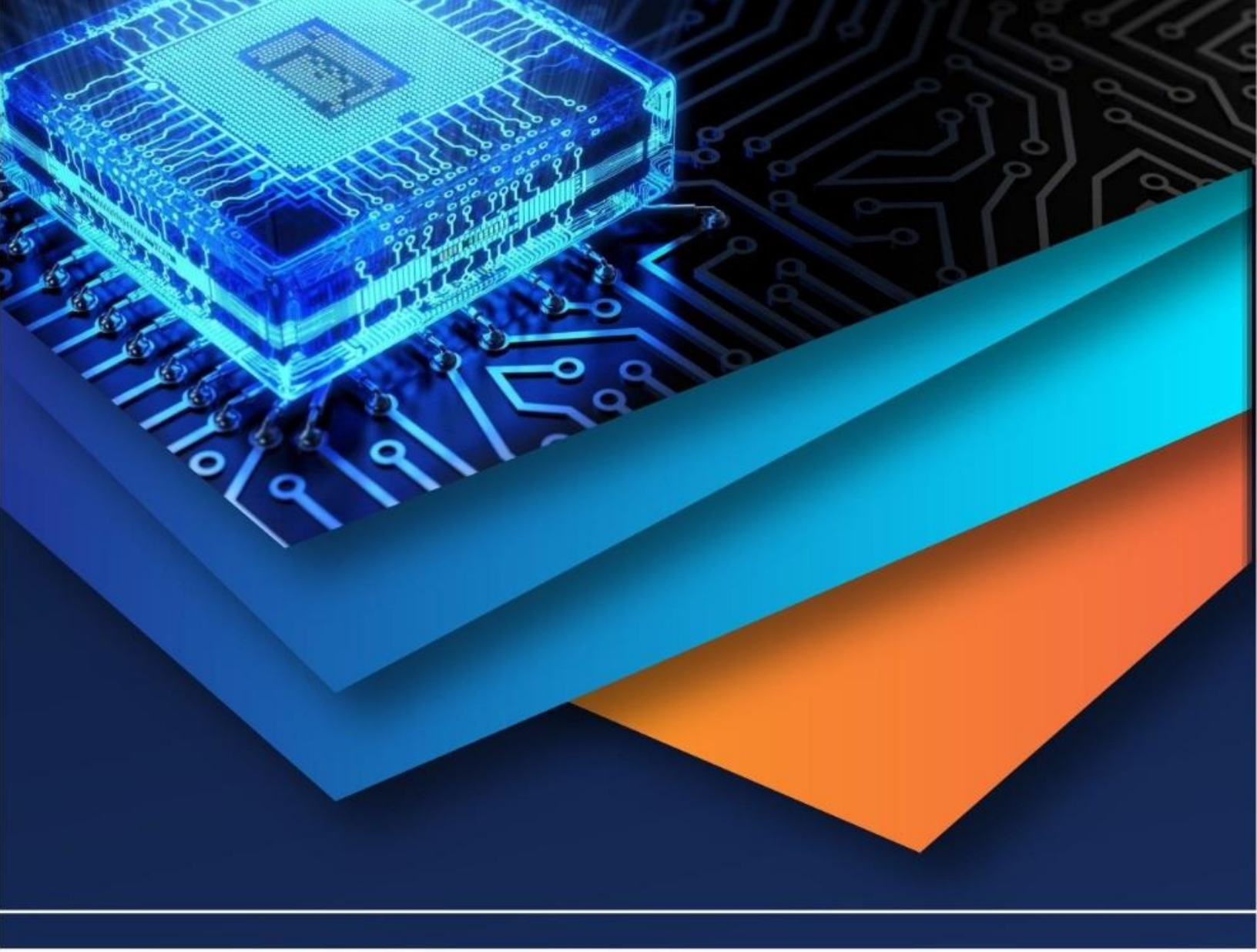

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