USE OF WASTE RUBBER TYRES IN ROAD CONSTRUCTION

A major project report submitted in partial fulfillment of the requirements

for the award of the degree of

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

by

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ABSTRACT

The growth rate of vehicles is the backbone of economic development of any country. India is the second fast growing automobile industry in the world. In today's era, solid waste management is the thrust area. On the other side, the traffic intensity is also increasing. As a result amount of waste tyres is also increasing. The increasing consumption of waste tire has generated many problems such as increasing landfill space, environmental pollution and causing health hazards. Parallel to this is the increasing of roads construction as a result of heavy traffic on roads. This study reviews to the use of crumb rubber (waste tires in powder form) in bitumen using the wet process.

The study focuses on the crumb rubber as a replacement to the total weight of bitumen. The design or life span for all highways and urban roads is 10 – 20 years. Unfortunately, damages or distresses on pavements are still occurring before reaching the maximum period of the designed road serviceability. Among the major influencing factor that is contributing to this distress is the repeated heavy traffic loading on the road surfaces. Moreover, the use of waste crumb rubber in road construction as a pavement surface has a better skid resistance, fatigue crack resistance and increased rut resistance. The review includes physical tests that are used to determine the physical properties of bitumen and modified crumb rubber mix. The physical tests involve penetration test, softening point test, and ductility test. The expectations from the study are to develop bitumen with waste crumb rubber that would minimize the costs of bitumen and providing better physical properties compared to the convention bitumen based on the tests that was conducted.

Keywords: Waste Tyre Rubber, Bitumen, Crumb Rubber, Wet Process, Flexible Pavement,etc

CHAPTER 6

CONCLUSION

In the present study, the importance was to add the shredded waste crumb rubber to aggregate and to evaluate the various mix properties like Impact value, abrasion value, crushing value, etc. And also, to check the property of Crumb rubber aggregate. To check the coating property of rubber aggregate with adhesive materials. To check crumb rubber material properties through both laboratory and field evaluation. Develop test data for specification for non -structural / low loading usage. To evaluate the properties of rubber resistance against cracking, fatigue and rutting. Making environment less harm from rubber waste. So in the end of this we get outcomes which are satisfying all the objectives, like: It modifies the flexibility of surface layer. Waste rubber tyres to be used is between the ranges of 5% to 20%. Problem like thermal cracking (Fatigue) and permanent deformation (Rutting) are reduce in hot temperature region. Rubber has property of sound absorption, which also help in reducing the sound pollution of heavy traffic roads. The use of rubber can improve the quality and performance of road. We can be save a certain quantity of natural stone aggregate.Following are some points which are drawn from the study:

1. Aggregate Impact value of control specimen was 5.43%. It reduced to 4.91% for PP8 and 4.26% for PP10. Reduction in value was 10% for PP8 and 22% for PP10. This shows that the toughness of the aggregate was increased to face the impacts.
2. Crushing Value was reduced from 19.2% to 13.33% and 9.82% for PP8 and PP10 respectively. Value reduced by 30% for PP8 and 48% for PP10. Low aggregate crushing value indicates strong aggregates, as the crushed fraction is low.
3. Specific Gravity of the aggregate increases from 2.45 for control specimen to 2.7 for PP8 and 2.85 for PP10 due to plastic coating
4. Stripping Value was reduced from 8% for control specimen to nil for PP8 and PP10. This shows that coated aggregate are more suitable for bituminous construction than plain aggregates.

EXPERIMENTAL SYUDY ON PARTIAL REPLACEMENT OF CEMENT WITH EGG SHELL POWDER IN M25 GRADE CONCRETE

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

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in

CIVIL ENGINEERING

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ABSTRACT

Currently India has taken a major initiative on developing the infrastructure such as express highways; power Projects and industrial structure etc., to meet the requirements of globalization, in the construction of building and other structure Concrete plays the key role and a large quantum of concrete is being utilized in every construction practices. The egg shell usually which are disposed, it is used as an alternate for the cement since the shell is made up of calcium. Egg shells are used in different combinations to find the feasibility of using the egg shells as an alternate to cement.

Egg Shell powder replaces 0%, 5%, 10%, 15% and 20% of weight of cement Concrete is cast, cured and compressive test were carried out to find the best combination which results in optimum percentage of strength. From the results it is found that the increasing percentage of ESP leads to increase in workability and decrease in strength. The results are for 28 days compressive strength for 0% is 25.2 N/mm2, 5% ESP is 36.53 N/mm2, 10 % ESP is 28.57 N/mm2,15% ESP is 27.37 N/mm2,20 % ESP is25.97 N/mm2. At 5%ESP we got the maximum strength of concrete.

Key Words: Egg shell, Compressive Strength, Egg Shell Powder

CONCLUSION

Extensive experimentation has been carried out to determine utilization of the egg shell powder as cement Replacement material by making the cement concrete. Based on the results obtained from the experimental work the following conclusions can be drawn

- Compressive strength was higher than conventional concrete for 5 %, 10%, 15% and 20% ESP replacement at 7, 14 and 28 days of curing ages.
- It is observed that the increasing percentage of ESP Decreasing in strength
- It is observed the increasing percentage of ESP leads to increase in workability of concrete
- The results are for 28 days compressive strength for 0% is 25.2 N/mm^2, 5% ESP is 36.53 N/mm^2,10 % ESP is 28.57 N/mm^2,15% ESP is 27.37 N/mm^2,20 % ESP is25.97 N/mm^2.

PARTIAL REPLACEMENT OF CEMENT IN CONCRETE WITH RICE HUSK ASH

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

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ABSTRACT

In India rice milling produces a byproduct which is known as Husk. This husk is used as fuel in rice mills to produced steam for boiling process. This husk contains near about 75% organic matter and the remaining 25% of this husk is modified into Ash during the firing process which known as rice husk ash (RHA). The rice husk ash (RHA) contains near about 85% to 90 % amorphous silica. By using rice husk ash in concrete, we can improve the properties of concrete. The current study and experimental investigation were taken to study the properties of concrete made with Rice husk ash. The replacement is done partially in the proportion of 0%, 20% and its effect on workability of concrete made with rice husk ash were investigated for the 20% rice husk ash replacement, the hardened properties such as compressive strength observed were good as compare to 0% RHA. The compressive strength test was conducted at 0% and 20% rice husk ash replacement and the highest compressive strength at 20% RHA replacement as compared to 0% RHA replacement at 14, 21 and 28 days.

CONCLUSION

Based on the limited study carried out on the strength behavior of Rice Husk ash, the following conclusions are drawn

- 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 14 days to 28 days followed by gradual increase from 28 days.
- 10 % of RHA Compressive strength range from 0 to 7 days value is 19.668 N/mm^2.
- 10 % of RHA Compressive strength range from 7 to 14 days value is 25.4N/mm^2.
- 10 % of RHA Compressive strength range from 14 to 28 days value is 26.08N/mm^2.
- By using this Rice husk ash in concrete as replacement the emission of greenhouse gases can be decreased to a greater extent.
- The technical and economic advantages of incorporating Rice Husk Ash in concrete should be exploited by the construction and rice industries, more so for the rice growing nations of Asia.
- May RHA of 10% cement can be replaced for maximum compressive strength.
- RHA based sand cement block can significantly reduce room temperature. Hence air conditioner operation is reduce resulting in electric energy saving.
- More over with the use of rice husk ash, the weight of concrete reduces, thus making the concrete lighter which can be used as light weight construction material.
- The pozzolanic activity of rice husk ash is not only effective in enhance the concrete strength, but also in improving the impermeability characteristics of concrete.
- As the Rice Husk Ash is waste material, it reduces the cost of construction.

EXPERIMENTAL STUDY ON PARTIAL REPLACEMENTOF CEMENT WITH MARBLE POWDER IN CONCRETE

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

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in

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EXTERNAL EXAMINER

ABSTRACT

Concrete is one of the significant materials of the construction industry. These days because of expansion in a population, the demand of infrastructure is expanding day by day. This prompts the increment in production of cement. In the present scenario the overall cement production is about 4.1 billion metric tons worldwide. This huge amount of production prompts utilization of natural resources and it is very unsafe for environment. Enormous amount of waste by-products are delivered from the manufacturing enterprises, for example, mineral slag, marble powder, silica fumes, rice husk ash, Waste marble sludge and so on. The project work here deals with the partial replacement of cement with marble waste in concrete at various percentages such as 0 %, 5%, 10%, 15%, 20%, 25% by mass of cement. The experimental investigations are carried out to find out the compressive strength of concrete samples cured for period of 7, 14 and 28 days. The results obtained from the experiments with satisfactory replacement of cement with marble powder are presented in this project report

Key words: Marble Powder, Compressive strength, Silica fume , Minerals slag , Waste Marblesludge .

CHAPTER – 8

CONCLUSION

In this experimental investigation, the effect of marble powder blended in control concrete with respect to compressive and spilt tensile strength behavior of the concrete cubes and cylinders have been investigated. The experimental results have been compared with the control mix concrete. The following conclusions are drawn from the present experimental investigation.

- Workability increases with increasing in the marble powder replacement in the concrete.
- The compressive strength and spilt tensile strength test, highest achieved for 15% marble powder replacing with cement.
- Based on the experiment result it showed that replacement of cement by marble powder up to 15% increases the compressive strength but above 15% content of marble powder decreases the compressive strength.
- Split tensile strength increases with increase in marble powder dust.
- Durability increases with increase in marble content but in small amount.
- By replacing Supplementary Cementitious Materials (SCMs) such as marble powder the cost of construction decreases and disposable problem of industrial wastes reduces.

BEHAVIOR OF CONCRETE FILLED PVC PLASTIC TUBES CONSIDER AS A COMPRESSION MEMBER

A Major Project Stage-II report submitted in partial fulfilment of the requirements for the award of the degree of

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ABSTRACT

This project aims at a detailed experimental investigation to improve ductility of columns and concrete filled PVC pipes as compression members. The concrete filled PVC tubes are prepared and curing is done for 28days.all specimens are tested vertically and are subjected to monotonically increasing axial load until compression failure occurs. Axial load-displacement relationships are recorded for each specimen and then the results of PVC filled concrete tubes are compared to that of conventional concrete of constant diameter of 150mm. Concrete is always expected to be stronger and more durable than in the past, while being cost and energy efficient. Moreover, the three major advantages that concrete possesses over other construction materials have to be conserved: the possibility of being fabricated practically anywhere; the ability to take form imposed by the shape of a mould; an low cost of the components and the manufacture. These factors have driven the advances in improving the performance of concrete over years, and continue to do so. The need for improving the performance of concrete and concern for the environmental impact arising from the continually increasing demand for the Concrete , has led to the growing use of alternative materials component. It is now clear that materials such as silica fume, rise husk ash, fly ash, ground granulated blast furnace slag and meta-kaolin be produced from abundant natural material which are waste material have to be used to partially substitute cement or to complement it when high performance is needed.

CHAPTER 7 CONCLUSIONS:

CONCLUSIONS AND RECOMMENDATIONS

This paper presents preliminary results on the behavior as well as the ultimate compressive strength of concrete filled PVC tubes. the following conclusions and recommendations are drawn:

1. The use of PVC tubes provides considerable lateral confinement to the concrete columns and hence, increases the ultimate compressive strength of concrete.

2. Concrete filled PVC tubes possess a great level of ductility as observed from the axial load-displacement relationship. The tube act as containment to the failed concrete core and exhibits large lateral deformation before failure.

3. As the slenderness ratio increases, the compressive strength of the concrete filled PVC tubes decreases.

4. Further research is required to evaluate the compressive strength of concrete filled PVC tubes with wide range of slenderness ratios and tube sizes and different concrete properties.

ENHANCING COPPER SLAG COMPACTION THROUGH THE ADDITION OF ADMIXTURE

A major project(Stage-II)report submitted in partial fulfillment of the requirements for the award of the degree of

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ABSTRACT

Objective: To find out the geotechnical properties of cupper slag to replace the soil in constructions.

Industrial waste is a type of waste produced by industrial activity, such that of factories, mills, mines. Copper slag is the one of the industrial waste available. It is a by product of copper production from copper ore. During smelting, a molten pool of copper forms at the bottom of the furnace while a layer of impure metal, which is the slag, is drained off from the top. Copper slag and lime form cementateous material on hydration. Lime is a general term for calcium containing inorganic material, in which carbonates, oxides and hydroxides predominate. Lime provides à comfortable environment. Lime mixes have good workability. Lime binders can be durable and have stood the test of time.

- Tests conducted on copper slag with limeCompaction
- Standard proctor testModified proctor test

Compaction is the process whereby air is crowded out & its volume decrease due to physical stress. Test is performed to determine the relationship between the optimum moisture content (OMC) and the maximum dry density (MDD) of a soil for a specified comp active effort.

By conducting the above experiments we find the optimum moisture content (OMC) and maximum dry density (MDD) of copper slag with different percentages of admixture and water. Analysis is done by drawing graphs using the values of OMC and MDD

8. CONCLUSION

1. Irrespective of compaction effort, the variation in MDD observed is minimal. And almost the MDD is varying from 2.26g/cc to 2.52g/cc.
2. Up to about 8% of moisture content addition to the CS is not causing liquid condition.
3. Beyond 8% of moisture content for any small increase in moisture content, water is easily coming out of the compacted CS.
4. As the % of lime increases from 2% to 10% the MDD values are slightly increasing where as the OMC values are observed to be increasing and decreasing.
5. From these results it can be noticed that as the % of Lime increases, there is no definite trend in the OMC irrespective of the compactive effort.
6. From the results, it is understand that addition of lime to the CS is not going to benefit in terms of behavior of material.
7. But same lime when mixed with CS along with soils may result in beneficial effects in terms of stabilization of clayey deposits.
8. Hence, as a future study, the combination of CS and lime along the soil can be mixed and relevant geotechnical testing can be carried out to bring out the efficiency of CS along with the lime in the soil stabilization process.

ENHANCING THE DURABILITY AND PERFORMANCE OF CONCRETE USING ACACIA NILOTICA ASH AND CRUMB RUBBER

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ABSTRACT

Concrete is widely used in construction due to its strength and durability. However, there is a constant need to improve its properties to meet the growing demands of the construction industry. This project aims to enhance the durability and performance of concrete by incorporating two innovative materials: Acacia Nilotica Ash (ANA) and Crumb Rubber (CR).

The utilization of waste materials in concrete production not only reduces environmental impact but also enhances the properties of concrete. Acacia Nilotica Ash, obtained from the burning of Acacia Nilotica plant residues, is a byproduct with pozzolanic properties. It can react with calcium hydroxide in concrete to form additional binding compounds, resulting in improved strength and durability.

Crumb Rubber, derived from recycled tires, is a granular material with excellent elastic properties. Adding crumb rubber to concrete can enhance its flexural strength, impact resistance, and energy absorption capacity. Furthermore, it contributes to the reduction of waste tires in the environment.

In this project, various concrete mixtures will be prepared with different proportions of Acacia Nilotica Ash and Crumb Rubber. The fresh and hardened properties of these mixtures will be evaluated through comprehensive laboratory testing. The fresh concrete tests will include workability, slump, and setting time, while the hardened concrete tests will focus on compressive strength, flexural strength, water absorption, and durability against various environmental factors.

CHAPTER-7

CONCLUSION

- The use of Acacia nilotica ash in concrete and their effects had been thoroughly studied from reputed journals for initiating the work. The preliminary investigations were done for basic ingredients of controlled concrete and with different fractions of replacement of cement (0%, 5%, 10%, and 15%) with acacia nilotica ash and 5 % of Crumb Rubber.

- The compressive strength of the cube with replacing 10% of acacia nilotica ash and 5 % of crumb rubber was obtained as 28.95Mpa for 14 days and the compressive strength of the conventional cube (M25 grade concrete) is 20Mpa. There was increase in the strength44.75 % for 14 days when compared with the conventional concrete strength.

- The split tensile strength of the cylinder with replacing 10% of acacia nilotica ash and 5 % of crumb rubber was obtained as 3.20 Mpa for 14days, and the split tensile strength of the conventional cylinder (M25 grade concrete) is 2.25 Mpa. There was increase in the strength 42.2 % for 14days when compared with the conventional concrete strength.

- After attaining the maximum value of strengths with replacing of 10% of Acacia Nilotica Ash and 5% of Crumb Rubber. Then the Compressive strength of cube, Split tensile strength of cylinder was decreased to 25.5Mpa, 2.7Mpa and with increasing in the percentage of the acacia nilotica ash beyond 10% and 5 % of crumb rubber.

- The maximum value of strength obtained with replacing 10% of Acacia nilotica ash with cement and 5% of Crumb Rubber with sand.

PARTIAL REPLACEMENT OF COARSE AGGREGATE BY JHAMA CLASS BRICK IN CONCRETE

A major project (stage-II) report submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

by

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ABSTRACT

The use of concrete is truly large and day by day the conventional material cost is also rising. The project focuses on coarse aggregate in concrete. In this project work, the study has been done on the partial replacement of coarse aggregate with demolished brick aggregate known as jhama brick. Jhama brick produced due to over burning. This material is chosen of their availability because a large number of bricks are rejected during the burning of brick due to unevenness of temperature. The brick has irregular shape and it is also used as coarse aggregate in some places where the stone aggregate is not effortlessly available or if available its cost is high. These rejected bricks can also be an implicit source of coarse aggregate. It's partially replacement of the conventional material. We replaced the coarse aggregate in ratios of 20% and 40% in M20 grade of concrete. Tests are conducted on fresh and hardened cement concrete, for example, compressive strength test at 7 days and 28 days of curing period. The data were collected and analyzed to satisfy the study on brick waste as an alternative in coarse aggregate partial replacement in concrete production.

CONCLUSION

On the basis of the result obtained during the experimental investigation, following conclusions were drawn,

- Brick bat concrete is cheaper than conventional concrete.
- The compressive strength was found 5..6%, 7.8% higher than that of conventional concrete when the coarse aggregate is replaced by 20% and 40% by Jhama class brick aggregate respectively for the age of concrete 7 days.
- The compressive strength was found 3.94%, 7.26% higher than that of conventional concrete when the coarse aggregate is replaced by 20% and 40% by Jhama class brick aggregate respectively for the age of concrete 28 days.
- The use of over burnt brick bat waste in concrete is possible to improve its compressive strength.
- Split Tensile strength of Jhama class brick based concrete was higher by 2.75% and 7.33% than that of conventional concrete for the replacement of 20% and 40% at the age of concrete 7 days
- Split Tensile strength of Jhama class brick based concrete was higher by 1.6% and 6.42% than that of conventional concrete for the replacement of 20% and 40% at the age of concrete 28 days

PERFORMANCE OF RED MUD IN CONCRETE AS A PARTIAL REPLACEMENT OF CEMENT

A major project(Stage-II)report submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

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ABSTRACT

The Bayer Process for the production of alumina from Bauxite ore is characterized by low energy efficiency and it results in the production of significant amounts of dust like, high alkalinity bauxite residues known as red mud. Disposal of large quantities of red mud; a solid-waste generated at the Aluminium plants all over the world possess an increasing problem of storage, land cost & availability and pollution. Nowadays, the wastes are not having any industrial applications, so it can be innovatively using these wastes as a raw material in the civil engineering field. Availability of raw material required for manufacturing of cement and production of concrete are limited in nature. So as to overcome this problem it is very much essential to utilize the industrial waste materials and by-products generated in manufacturing of cement and in concrete construction. By taking cementitious behaviour of the red mud into account, an experiment was carried out to partially replace the cement by red mud in concrete for different percentages (0%, 5%, 10%, 15%, 20%, 25%) and also its effects on the strength and other properties of the concrete is studied by compressive strength,split tensile strength for M30 grade concrete.

Key words: Bayer process, Red mud, Compressive strength test, Split tensile test.

CONCLUSION

- From this experimental study following points can be drawn:
- For each percentage replacement up to 20% the compressive strength values of the red mud concrete coincides with that of conventional concrete. And for beyond the 20% of replacement of redmud the compressive of concrete decreases.
- For each percentage replacement up to 20% the flexural strength values of the red mud concrete coincides with that of conventional concrete.
- For each percentage replacement up to 20% the tensile strength values of the red mud concrete coincides with that of conventional concrete.
- Optimum percentage of the replacement of cement by weight is found to be 20%.
- By this replacement results got are nearly equal to the results of conventional concrete.

From above results we can say that...

- We use mixture of red mud and cement for nonstructural work. There is a future scope for the use of red mud concrete in structural point of view.
- Concrete prepared by using red mud is suitable for also in ornamental works and gives aesthetically pleasant appearance.
- Used for road construction as an embankment landfill is an attractive option with a high potential for large volume reuse.
- The above results show that the optimum utilization of Red mud in concrete is 20% as a partial replacement of cement.
- This study concludes that Red mud can be innovative supplementary cementitious materials but judicious decision must be taken by expert engineers

IMPROVING STRENGTH OF CONCRETE USING ALCCOFINE AND RICE HUSK ASH

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

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in

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ABSTRACT

Now a days concrete utilization is increasing worldwide. Huge amount of concrete usage leads to scarcity of natural resources. Many researches have been investigated to enhance the properties or quality of the conventional concrete by adding some other materials to the conventional concrete. In this study we are using Alccofine and Rice husk ash as a cementitious materials . The main objective of this paper is to increase strength of concrete by using Alccofine and rice husk ash as partially replacement by weight of cement.

Alccofine is a new generation supplementary cementitious material (SCMs) for production of high strength concrete and high performance concrete. Rice husk ash is an agricultural rice paddy wastage. It can be generated by heating rice husk at the temperature of below 800°C.

Alccofine and rice husk ash are added by weight of cement to produce high strength concrete and reduce environmental issues. This paper shows the mechanical properties of concrete by using alccofine and rice husk ash. An experimental investigation carried out on concrete consist of alccofine and rice husk ash in the range of 0%, 5%,10%, 15%, 20% respectively, by weight of cement for M30 grade of concrete. Materials were collected, tested and compared with conventional concrete in terms of workability, compressive strength, flexural strength, tensile strength, rebound hammer test and durability tests. The tests were done by using standard cube of 150×150×150 mm, prism 500 ×100× 100 mm and cylinder 150 mm diameter and 300 mm height specimens at the age of 28 days.

CHAPTER-6

CONCLUSION

1. Characteristic compressive strength of M30 grade of concrete is obtained.
2. Slump value of concrete decreases as increasing the percentage of Rice husk ash and Alccofine.
3. Slump value is decreases about 36% than normal concrete at 10% of AF and 10% RHA used in concrete as a replacement by weight of cement.
4. The maximum compressive strength is achieved at 10% of AF and 10% RHA used as a replacement by cement in concrete and its strength is about 45.32 Mpa, which is 15.29 % more than conventional concrete.
5. The maximum tensile strength is achieved at 10% of AF and 10% RHA used as a replacement by cement in concrete and its strength is about 4.98 Mpa, which is 16.35% more than normal concrete.
6. The maximum flexural strength is achieved at 10% of AF and 10% RHA used as a replacement by cement in concrete and its strength is about 4.72 Mpa, which is 20.40% more than normal concrete.
7. The maximum compressive strength is achieved at 10% of AF and 10% RHA used as a replacement by cement in concrete and its strength is about 64.55 Mpa, which is 24.59 % more than conventional concrete by using rebound hammer test.
8. Percentage loss in compressive strength of concrete is decreased up to 10% of AF and 10% RHA used as a replacement by cement in concrete and its strength is about 22.06 Mpa, which is 27.05 % less than conventional concrete.
9. The maximum compressive strength is achieved at 10% of AF and 10% RHA used as a replacement by cement in concrete and its strength is about 45.32 and 35.32 without and with acid curing, respectively. Which is 22.06 % decreased by normal curing.
10. Durability of AF and RHA concrete is increased by increasing up to 10% of each AF and RHA.
11. Up to 20% (10% AF and 10% RHA) of the cementitious material can be partially used in the concrete.

COCONUT FIBRE REINFORCED CONCRETE

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

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by

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ABSTRACT

Sustainability is a wide accepted concept in modern construction scenario. Even though the construction industry is revolutionizing in a significant manner in terms of both equipment and materials used, the cost of construction has skyrocketed along with the deteriorative impact on environment. This resulted in the adoption of a more balanced approach with the environment as its nerve centre to create a better world to live in. This has led to the adoption of a natural fibre like Coconut for the strength enhancement in concrete

Coconut fibre is available in abundance at the test site, which makes it quite viable as a reinforcement material in concrete. Further, it acts as a new source of income for the coconut producer who gets the benefits of the new demand generated by the construction industry. In addition to this, it is an effective method for the disposal of coir mattress waste which will reduce the demand for additional waste disposal infrastructure and decrease the load on existing landfills and incinerators. The problem of high rate of water absorption of the fibre could be reduced by coating the fibres with oil. Moreover the fibres being natural in origin is ecologically sustainable and can bring down the global carbon footprint quite effectively.

This study aimed at analyzing the variation in strength of coconut fiber (oil coated raw and oil coated processed fibres) reinforced concrete at varying fibre contents and to compare it with that of conventional concrete. The various strength aspects analyzed are the flexural, compressive and tensile strength of the coconut fiber reinforced concrete at varying percentages (4%,5%,6% by the weight of cement) of fibre. The influence of shape of fibre on strength is also studied by testing on coconut fibre mesh of predetermined dimensions. The optimal percentage of both the processed fibre strands and raw fibre meshes were found out by trial and error and the optimum percentage of super plasticizer needed for the required workability was also determined.

CHAPTER-5

CONCLUSION

Coconut fibre is available in abundance at the test site, which makes it quite viable as a reinforcement material in concrete. Further, it acts as a source of income for the coconut producer who gets the benefits of the new demand generated by the construction industry. In addition to this, it is an efficient method for the disposal of coir mattress waste which will reduce the demand for additional waste disposal infrastructure and decrease the load on existing landfills and incinerators. Coconut fibres being natural in origin, is ecologically sustainable and can bring down the global carbon footprint quite effectively.

The objectives of this work were:

1. To find out variation in compressive, tensile and flexural strengths of CFRC using processed fibre strands and raw fibre meshes at varying fibre contents and to compare it with that of conventional concrete
2. To determine the influence of shape of fibres on strength of concrete
3. The scope of this project was limited to rural residential constructions.

The major conclusions from this study are

a. At 5% addition of coconut fibre with a water cement ratio of 0.5, compressive strength tests yielded best results. However, the compressive strength decreased on further fibre addition. This must be due to the fact that when the fibres are initially added to concrete, the finer sized fine aggregates enter into the surface pores in the fibre creating a better bonding between the fibre and mix, however further addition of fibres resulted in formation of bulk fibre in the mix which will lead to decrease in bonding. Hence there is an optimum value of fibre to cement ratio, beyond which the compressive strength decreases. Hence 0.5 was taken as the optimum water cement ratio and optimum fibre content was taken as 5%.

b. When the fibre content is increased there is an increase in split tensile strength with a maximum at 5%. However when the fibre content is increased beyond this value a reduction in tensile strength is observed. This is due to the fact that tensile failure occurs due to the dislocation of atoms and molecules present in concrete.However when the fibre is added it acts as a binder holding them together

c. When fibre content is increased there is an increase in flexural strength with a maximum at 5% of fibre. However when the fibre content is increased beyond this value downward slope of the graph is observed. This is also due to the binding properties of coconut fibre owing to its high tensile strength of 21.5 MPa.

d. A decreasing trend in compressive strength was observed in concrete with mesh shaped fibres. This is due to formation of weak inter transition zone around these fibres, making the entire specimen weak. Moreover the thickness of the fibres can hinder better packing of the constituents of concrete thereby making it weak. The presence of dust and other impurities on the surface of fibres can also be another reason for this reduction in strength which may interfere with the bonding of mix and subsequent strength formation.

e. The tensile properties and cracking pattern of CFRC shows that it can be particularly useful in construction activities in seismic zones due to its high tensile strength and post peak load behaviour, which offers sufficient warning to the inhabitants before complete collapse of the structure.

f. Due to its relatively higher strength and ductility, It can be a good replacement for asbestos fibres in roofing sheets, which being natural in origin pose zero threat to the environment.

g. Since higher strength is attained at a lower design mix. It can be used to manufacture building blocks at relatively lower costs in comparison to plain concrete blocks thus making it suitable for rural residential buildings upto 10m height or as protection walls around buildings.

h. It can also be used as the reinforcement material in cement fibre boards which can act as a good backing to tiles thereby improving its impact resistance and also in faux ceilings. The advantage of cement fibre boards is its ability to survive under moist environments unlike paper based gypsum boards.

5.1 LIMITATIONS OF THE PROJECT:

The limitations of this project are:

1) This study on coconut fibre reinforced concrete is limited to rural residential constructions.
2) The mix design is for M20 concrete and it is usually used in buildings of heights upto10 m.
3) Mix design for concrete is done for mild exposure conditions and corrosion study is not done.

5.2 FUTURE SCOPE:

The effect of coconut fibres on high strength concrete should be studied and thus the use of CFRC can be extended to industrial and commercial buildings. Since the corrosion study is not done, the applicability of CFRC in reinforced constructions could be tested.

Coconut fibre is a good insulator in itself and as such it can improve the thermal properties of concrete. This is particularly useful in a tropical country like India where the mercury levels are quite high for most part of the year, so as to maintain the room temperatures within comfort levels of its inhabitants. It can also reduce the load on air conditioning systems thus reducing the power consumption.

The acoustic properties of concrete reinforced with other natural fibres have been studied in the past using an impedance tube apparatus and the results are fair enough to justify the use of coconut fibres as an alternative which is a good absorbent due to the presence of surface pores.

EXPERIMENTAL STUDY OF STRUCTURAL BEHAVIOR OF MESH-BOX GABION

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

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CHAPTER-5
CONCLUSION

5.1 Conclusions:

Gabion is a structural element mainly used in walls that resisting lateral earth pressure, it isa permeable element composed of steel bars, natural aggregate and wire mesh, It is also designed tosustain vertical load usually its own weight, Throughout this research, we have investigated the mechanical behavior of gabion structural boxes under the vertical load represented as compressive strength.

Gabions showed strength that ranged from **1185 KN/m2 to 527.5 KN/m2,** which varied according to diameters and steel bars. The following conclusions were drawn according to the results acquired by this research:

- The results showed a high influence of steel bar diameter on the strength of the gabions.This matches the outcomes from previous study which reported that the load is mainly transferred to the steel bars rather than the soil aggregates. The study showed that the stresses that transferred to the steel are two orders of magnitude greater of the stresses transferred to the aggregates.

- The results showed that smaller aggregate sizes resulted in higher strength. This could be explained on the bases of the potential surfaces that resist friction between soil particles. This increases the paths of stress transfer to the soil and then to the base of the box. At thesame time, it mitigates the stress that transfers to each grain of the aggregates. Moreover, the transfer of the loads to the side walls of the mesh box becomes more concentrated in the case of large particles. This increases the potential for failure.

- In addition, the mode of failure that was typically noticed shows that steel bars bend outwards. However, many boxes showed different modes of failure. The visual investigation suggests that the failure is related to the manufacturing quality of the boxes. This suggests that the modes of failure of mesh-box gabions is sensitive to the manufacturing defects.

- The elasticity of the samples were noticed to be almost of the same magnitude. This remarkable noticed could be explained on the basis of the fact that the load is basically transferred to the steel bars. This suggests that the elasticity of the boxes wasgoverned by the elasticity of the steel, which was the same for all samples.

- Furthermore, it is important to mention that a research has been conducted in the same university ;(Swati et al 2016 studying structural behavior of steel mesh box gabion usingnumerical modeling), the research discussed the same topic of gabion compression but using software, the output was approximately running in the same trend of this research.

IMPROVEMENT OF COMPRESSIVE STRENGTH OF PERVIOUS CONCRETE

A major project report submitted in partial fulfillment of the requirements

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ABSTRACT

Pervious concrete is a special type of concrete, which consists of cement, coarse aggregate, water and if required, admixtures and other cementitious materials. As there are no fine aggregates used in the concrete matrix, the void content is more which allows the water to flow through its body. So the pervious concrete is also called as permeable concrete and porous concrete.

There is lot of research work is going in the field of pervious concrete. The compressive strength of pervious concrete is less when compared to the conventional concrete due to porosity and voids. Hence, the usage of pervious concrete is limited even though it has lot of advantages. If the compressive strength and flexural strength of pervious concrete is increased, then it can be used for more number of applications. For now, the usage of pervious concrete is mostly limited to light traffic roads only. If the properties are improved, then it can also be used for medium and heavy traffic rigid pavements also. Along with that, the pervious concrete eliminates surface runoff of storm water, facilititates the ground water recharge and makes the effective usage of available land.

The main aim of our project is to improve characteristics of pervious concrete. But it can be noted that with increase in strength, the permeability of pervious concrete will be reduced. Hence, the improvement of strength should not affect the permeability property because it is the property which serves its purpose.

CHAPTER-5

CONCLUSION AND SCOPE FOR FUTURE WORK

5.1 CONCLUSION:

- The size of coarse aggregates, water to cement ratio and aggregate to cement ratio plays a crucial role in strength of pervious concrete.
- The void ratio and unit weight are two important parameters of pervious concrete in the context of mix design.
- The compressive strength and coefficient of permeability of pervious concrete are inversely proportional to each other up to addition of 8% of fines.
- Among the two methods of increasing compressive strength of pervious concrete, the addition of fines has gave more value when compared to replacement of cementitious materials.
- The addition of fines and replacement of cementitious materials will reduce the permeability capacity of pervious concrete.
- The compressive strength of pervious concrete is increased by 15.25% when 5% fine aggregates were added to the standard pervious concrete.
- The compressive strength of pervious concrete is increased by 18.13% when 6% fine aggregates were added to the standard pervious concrete.
- The compressive strength of pervious concrete is increased by 21.57% when 7% fine aggregates were added to the standard pervious concrete.
- The compressive strength of pervious concrete is increased by 25.93% when 8% fine aggregates were added to the standard pervious concrete.
- The compressive strength of pervious concrete is increased by 23.96% when 9% fine aggregates were added to the standard pervious concrete.
- The compressive strength of pervious concrete is increased by 20.52% when 10% fine aggregates were added to the standard pervious concrete.
- The compressive strength of pervious concrete is increased by 7.17% when 10% fly ash was replaced in the place of cement.
- The compressive strength of pervious concrete is increased by 14.05% when 10% rice husk ash was replaced in the place of cement.

- The compressive strength of pervious concrete is increased by 6.11% when 5% fly ash and 5% rice husk ash was replaced in the place of cement.
- The coefficient of permeability is decreased by 25.24% when 8% fines are added to standard pervious concrete.
- The coefficient of permeability is decreased by 51.46% when 10% fines are added to standard pervious concrete.
- The coefficient of permeability is decreased by 42.72% when 10% cement is replaced by fly ash in standard pervious concrete.
- The coefficient of permeability is decreased by 48.54% when 10% cement is replaced by rice husk ash in standard pervious concrete.
- Hence it is recommended that addition of 8% fine aggregates to the pervious concrete will satisfy both the compressive strength and permeability of pervious concrete.

5.2 SCOPE FOR FUTURE WORK:

- In the past due to the scarcity of cement, the pervious concrete has been used extensively.
- The pervious concrete has lost its importance after successful production of cement in large quantities.
- But now-a-days, the usage pervious concrete has gained its popularity due to many advantages.
- The urban areas all over the world have become CONCRETE JUNGLES. The discharge of storm water is very difficult problem in the present conditions.
- By using the pervious concrete we can able to recharge the ground water table and the storm water disposal can also be done.
- So, in future to tackle aforesaid problems and to protect people from flood prone areas, the pervious concrete is one effective Solution.

5.3. PERVIOUS CONCRETE-INDIAN SCENARIO:

Pervious concrete can be successfully used in India in applications such as parking lots, drive ways, gullies or sidewalks, road platforms etc., over the next 20 years, there is expected to be a significant amount of housing construction in India. The around the apartments, houses and the compound can be with pervious concrete.

Massive urban mitigation in India cities is causing the ground water to go much deeper and is causing water shortages. For example, in states like Tamilnadu residents commonly pay for water delivered and it is not uncommon to receive water only for a few days of a week in many parts of the country. Flooding and extended water-logging in urban areas is common since all the barren land which could not hold the rain water are being systematically converted into valuable real estate with a result that impervious surfaces such as roads, roof tops, parking lots are covering natural vegetation. It is indeed ironical that even the world's wettest place CHERRAPUNJI suffers drought while the monsoons brings flooding. Further, the rain water that falls on the concrete and asphalt surface tend to carry a high level of pollution ends up in our water ways ultimately. The use of pervious concrete can help alleviate the damage of all of these ill effects.

Another significant advantage of India as compared to western countries is the significantly lower cost of the labor. Much of the pervious concrete construction is manual and can be done without heavy equipment and therefore, pervious concrete can be placed at a lower cost even in the rural areas.

A caution is though is the highest prevalence of air-borne dust in India that could lead to clogging f the pervious concrete. Pervious concrete can function with no maintenance is with some level of clogging. Nevertheless frequent preventative maintenance is recommended. In apartment communities, resident associations could perhaps tae this over and those applications would be the first ones to be attempted.

In future, with increased urbanization, diminishing ground water levels and focus on sustainability, technologies such as pervious concrete are likely to become more popular in India as well as other countries.

EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF COARSE AGGREGATE WITH RECYCLED AGGREGATE

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

CIVIL ENGINEERING

by

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ABSTRACT

In countries like India every year millions of tons of construction and demolition waste are produced which contains reusable materials like coarse and fine aggregates mixed with cement mortar. If they are not properly employed, they will become source of pollution and occupy land fill space. On the other hand, in India the present rate of utilization of the waste materials is only about 10%. If they are effectively used for producing concrete it leads to sustainable construction approach.

In this project we are replacing Natural Coarse Aggregate (NCA) with Recycled Concrete Aggregate (RCA) in conventional concrete.

The aim of this project is to determine the possibility of Replacing Natural Coarse Aggregate (NCA) with Recycled Coarse Aggregate (RCA). The various combinations of RCA and NCA (0:100, 10:90, 20:80, 30:70) % are considered in M30 concrete mix. The optimum percentage of replacement of NCA with RCA will be determined and workability, rate of gain strength is increased with the help of Polycarboxylate Ether super plasticising admixture.

Key words: construction and demolition waste, Natural coarse aggregates, Recycled coarse aggregates, super plasticising admixture.

CHAPTER 8
CONCLUSION

- The following conclusions are drawn based on the experimental investigations on Compressive strength, split tensile strength and considering the -environmental aspects also:
- From material testing it can be concluded that RCA specific gravity crushing strength and impact strength is less than natural aggregate and Water absorption of recycled aggregate is 1.2% more than natural aggregate.
- Workability of conventional concrete is lesser than the recycled aggregate concrete due to adding of admixture.
- The Compressive strength of M1 (10 % of RCA and 0.5 % of admixture) concrete is 17.7 % more than the conventional concrete (M30 with no admixture) and M2 (20% of RCA and 0.5 % of Admixture) is 9.6 % more than conventional concrete and 7.6 % less than M1 concrete and M3 (30% of RCA and 0.5 % Admixture) concrete has approximately equal strength of conventional concrete.
- The split tensile strength of M1 (10 % of RCA and 0.5 % of admixture) concrete is 8.4 % more than the conventional concrete (M30 with no admixture) and M2 (20% of RCA and 0.5 % of Admixture) is 4.24% more than conventional concrete and 3.9 % less than M1 concrete and M3 (30% of RCA and 0.5 % Admixture) concrete 2.1 % less than the conventional concrete.
- The results of compressive strength and split tensile strength show that upto 30 % replacement of RCA with Na we can achive target strength and there is no effect on fresh concrete also due to the use of admixture. Further increase RCA percentage results in strength lower than the target strength and workability of concrete also decreases due to increasing of water absorption of aggregate.
- **Environmentally Friendly:** Recycled aggregate concrete is an environmental friendly solution to support sustainable construction. Reusing of used aggregate decrease building waste produced on earth and decreasing of natural aggregate content correspondingly decreases environment related problems.

- **Cost Effective**: the cost of producing recycled aggregate is 40 % less than that of natural aggregate. This is because it does not have to be mined and can be produced relatively easily.

EXPLORING OF SHEAR WALL CONSTRUCTION

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

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in

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ABSTRACT

Shear wall construction is a structural system widely employed in building design to enhance stability and resistance to lateral loads. This construction method utilizes vertical walls or panels, known as shear walls, to distribute and dissipate forces generated by seismic activity, wind, or other lateral forces. Shear walls play a critical role in improving the structural integrity and overall performance of buildings in high-risk areas.

This abstract aims to provide an overview of shear wall construction, its advantages, limitations, and key considerations. The advantages of shear wall construction include enhanced structural stability, efficient load transfer, resistance to lateral loads, space optimization, construction efficiency, fire resistance, sound insulation, and longevity. These benefits make shear wall construction a compelling choice for achieving structural resilience in seismic and wind-prone regions.

However, shear wall construction does come with certain limitations and considerations. These include space constraints, structural complexities, retrofitting challenges, reduced flexibility for future modifications, additional costs, and potential aesthetic considerations. Understanding and addressing these factors are essential in ensuring the successful implementation of shear wall construction projects.

To fully harness the benefits of shear wall construction, proper engineering analysis, design considerations, and adherence to building codes and regulations are crucial. Qualified structural engineers play a key role in the design and implementation process, ensuring that shear walls are appropriately integrated into the building's structural system and meet the required performance criteria.

In conclusion, shear wall construction offers significant advantages in terms of structural stability and resistance to lateral loads. While it may have limitations, careful planning, and attention to detail can mitigate potential drawbacks. Shear wall construction remains a valuable solution for achieving robust and resilient structures in areas susceptible to seismic and wind forces, contributing to safer and more durable buildings.

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CONCLUSION

In conclusion, shear wall construction offers numerous advantages that contribute to its popularity in building design. Shear walls provide enhanced structural stability, efficient load transfer, and resistance to lateral loads, making them particularly suitable for areas prone to seismic activity or high wind loads. Additionally, shear walls optimize space utilization, offer construction efficiency, and provide benefits such as fire resistance, sound insulation, and durability.

However, it is important to consider the potential disadvantages of shear wall construction. These include space limitations, structural constraints, retrofitting challenges, construction complexity, reduced flexibility for future modifications, additional costs, and aesthetic considerations.

Overall, shear wall construction is a valuable and effective solution for achieving structural stability and enhancing the seismic and wind resistance of buildings. Careful planning, detailed engineering analysis, and adherence to building codes and standards are crucial in realizing the full potential of shear wall construction while mitigating any potential drawbacks. Consulting with qualified professionals and conducting a comprehensive project evaluation will ensure successful implementation and the optimal performance of shear wall construction in the specific project context.

BEHAVIOUR OF CONCRETE BY PARTIAL REPLACEMENT OF COARSE AGGREGATE WITH PLASTIC BOTTLE PIECES

A major project report submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

in

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ABSTRACT

By replacing coarse aggregate as well as fine aggregate with waste plastic known as green innovation. As the years go by, waste plastic increases day by day, since most of the plastic used by human is non-bio-degradable. The idea behind this review is to identify research done by the researchers who uses recyclable material such as plastic obtained mostly from waste plastic that the people had generated around the world by utilisation of waste plastic in becoming of construction materials in order to overcome the environment problem that the society are facing. This project aim is to review the using of waste plastic to replace fine and coarse aggregate and stated the mechanical properties of the concrete. With different percentage replacement of aggregates will affect the different properties such as slump, compressive strength and ultimate strength of the concrete and compare with the control sample in order to find the suitable percentage of the waste plastic to replacement of aggregates for the concrete used. It was found that plastic as replacement for fine and coarse aggregate both have has lower compressive quality of the concrete, almost the same or lower slump test value for ordinary concrete and waste plastic concrete and lower density for the waste plastic concrete compare to the ordinary concrete.

The present study is aimed at concrete mix with partial replacement of coarse aggregate by waste plastic bottle pieces (0%,5% and 10%) that will provide an advantage inreducing the dead weight of the structure. This mix in the form of cubes were subjected to ascertain the strength parameter.

Hence the use of waste plastic bottle pieces in concrete making is not only beneficial but also helpful in disposal of plastic wastes.

CHAPTER-12

CONCLUSION

The experimental results have shown the use of waste plastic material in making concrete/mortar can provide an alternative solution to minimize the environmental impact due to unscientific disposal of waste plastic. The following conclusions were drawn:

- The properties of concrete containing various percentage of plastic (0%, 10%, 20%, and 30%) were tested for its physical properties and compressive strength.
- The waste plastic used for experiments is of LDPE (Low Density Poly Ethylene), 5-7mm size and specific gravity of waste plastic is found to be 0.92.
- The compressive strength of test concrete is compared with plain concrete and it is found that the compressive strength up to 80% is achieved for a mix of waste plastic up to 30% (as a replacement for coarse aggregate) in concrete. Hence it is recommended for light weight concrete structures.
- The mechanical properties of the test concrete did not display any notable differences depending on the colour of the plastic waste.
- This research also has potential application for the production of lightweight concrete, for minimizing the amount of polymer wastes in landfills, and the creation of decorative, attractive landscaping products.

Advantages:

- A better workability is achieved for plastic reinforced concrete in comparison to the conventional one.
- Considerable reduction in the weight results in the formation of light weight concrete.
- Recycled plastic in the construction purpose can set a benchmark by utilizing the non-bio-degradable waste and eventually minimizing the environmental pollution.

Disadvantages:

- Strength achieved for the plastic replaced concrete is slightly less than the conventional concrete but can be improved by the use of admixtures.
- Cost of plastic is high in the place where we need to buy from the dealers and hence the cost of construction also increases.
- There is no proper bonding of plastic materials in the matrix unless admixtures are used

Scope of future work

The present research can be extended to

- The test can be carried out for different grades of concrete.
- The use of admixtures in the test can be performed to get improved strength.
- Experimental study has to be conducted for other varieties of plastics like HDPE, PP, PET etc.
- The durability of such a concrete has to be tested for beams and columns with varying proportions of waste plastic at different ages.

PARTIAL REPLACEMENT OF COCONUT SHELL AS COARSE AGGREGATE

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EXTERNAL EXAMINER

ABSTRACT

The high cost of conventional construction material affects economy of structure. With the increasing concern over excessive exploitation of natural aggregates, synthetic lightweight aggregate produced from environmental waste is a viable new source of structural aggregate material. It is becoming more difficult to find natural resources. Therefore, the coconut shell as partial replacement for coarse aggregate in concrete is studied. The density, slump and compressive strength of concrete are tested. The replacement of coarse aggregate by coconut shell by 0%, 10%, 20% and 30%. The tests were carried out and the results obtained suggested that the replacement more than 20% leads to lightweight aggregate concrete. The slump found out to be increases as the percentage replacement increased. Similarly, the density is reduced as the percentage replacement increased. The compressive strength found to be decreases as the percentage replacement increases.

Keywords: coconut shell, lightweight aggregate, compressive strength, slump and density

CHAPTER 9

CONCLUSION

The coconut shell has potential as light weight aggregate in concrete. Also, using the coconut shell as aggregate in concrete can reduce the material cost in construction because of the low cost. Use of coconut shell in concrete can help in waste reduction and reduction in pollution. Generally, the compressive strength of concrete added with coconut shell decreased as the percentage of coconut shell added is increased. Same result goes to the workability test, the workability of concrete decreased as percent of coconut shell added in concrete is increased. Coconut shell can be utilized as fractional substitution of coarse total as there is negligible distinction in quality between coconut shell and tradition total. Because, of it is a waste material and abundantly available in the area of its production and near the industry used coconut, one can reduce the effective cost of the concrete and it is also helpful for the environmental point of view.