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1.3.3 Percentage of students undertaking project work/field work/ internships (Data for the latest completed academic year)

Dept: M.E – SE **Academic Year: 2019-2020**

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EXPERIMENTAL INVESTIGATION OF LATHE SCRAP AND GGBS IN CONCRETE

A THESIS

Submitted by

ABDUL BASITH A

in partial fulfillment for the award of the degree of

MASTER OF ENGINEERING IN STRUCTURAL ENGINEERING

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INTERNAL EXAMINER

EXTERNAL EXAMINER

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ABSTRACT

The project explains about an experimental study on strength properties of concrete with steel scrap. Steel scrap can be used as fiber which is collected from the lathe industries. Concrete with steel waste used in construction industry reduces the disposal problem. It is generated by each lathe industries Dumping of these wastes contaminates the soil and groundwater, which creates a harmful environment. In addition, to get sustainable development and environmental benefits, lathe scrap with concrete is likely to be used. In this project steel scrap concrete using lathe waste is prepared and its properties are studied. Test like Compressive Strength test and Flexural Strength test were conducted to determine the impact of steel waste in concrete, 7 days and 28 days test were conducted to find out the strength of concrete with steel waste. Lathe scarps are the waste materials which are collected from workshops and other steel industries at very minimum cost. They are similar to the steel fiber but they don't have any regular shape and size. The dimension varies with nature of source that is depends upon the type of industries. Scraps considered in this work are 0.5mm thickness. The concrete reinforced with steel scrap naturally have which could be used in the construction of structures in zone 3 seismic areas.

CHAPTER-5

CONCLUSION

Based on limited experimental investigations concerning Compressive strength and Flexural strength of concrete , the following observations are made regarding the resistance of partial replacement of Lathe scrap and GGBS. From laboratory tests, maximum compressive strength at 7 days obtained is 20.65N/mm^2 and at 28 days obtained is 28.78N/mm^2 , obtained at 30% replacement of fine aggregate with Lathe scrap and GGBS. Then maximum flexural strength at 28 days obtained is 10.55N/mm^2, obtained at 30% replacement of fine aggregate with Lathe scrap and GGBS . A better result is obtained when compared with the conventional concrete. Natural resources are not unlimited and also, there is a global need to protect to our environment and preserve our scarce natural resources for next generation. Use of lathe waste in concrete is beneficial as compared to conventional concrete, it reduces the environmental pollution, avoid soil infertility, land filling and environmental hazards created by industrial waste of iron and steel industries as well as providing economical value for the waste material. Environmental effects of wastes and disposal problems of waste can be reduced through this research. A better measure by an innovative Construction Material is formed through this project . This study helps in converting the non valuable Lathe scrap into a strengthen admixture in concrete .

EXPERIMENTAL INVESTIGATION WITH HYBRID FIBRES ON CONCRETE

A THESIS

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ABSTRACT

This project describes experimental studies on the use of HYBRID fibre such as banana & bamboo fibre to enhance the strength and application of concrete. The hybrid fibres has excellent physical and mechanical properties and it can be utilized more effectively. The natural fibres are the one at which it has been easily available on the environmentally, recently there has been rapid growth in research and innovation on it. Interest is warranted due to the advantages of these materials compared to others, such as synthetic fibre composites, including low environmental impact and low cost and support their potential across a wide range of applications. Concrete cubes were casted with hybrid fibres, it includes bamboo and banana fibre. The test specimens were cured and tested for compressive strength as per IS specifications at 7 days and 28 days. When the hybrid fibres are added up to 1% on concrete, it increases strength and then the addition of 2% & 3% of strength. When the hybrid fibres are added up to 1.5% on concrete, it increases strength and increasing the admixture range it gives good results so the admixture range within 1% gives the desired results respectively.

CHAPTER-5

CONCLUSION

From the results and discussion, it was concluded that the natural resources are god to the mankind. But these renewable resource and hybrid fibre will soon deplete. For maximum potential, utilize the hybrid fibre for the development of the science and technology. Hence this project is done with hybrid fibres such as MUSA & BAMBUSA FIBRE as admixture.

- It is found to decrease by $7N/mm^2$ to $9N/mm^2$ for 2% addition of BAMBUSA FIBRE when compared to conventional concrete specimen.
- It is found to decrease drastically by $12N/mm^2$ to $15N/mm^2$ for 2% addition of BAMBUSA FIBRE when compared to conventional concrete specimen.
- Increasing the fibre range in concrete it gives poor results so the admixture range within 1% gives the desired results.
- The compressive strength increases by nearly 10% to 15% for 0.5% addition of HYBRID FIBRE when compared to conventional concrete specimen.
- It is found to increase by 2% to 5% for 1.5% addition of HYBRID FIBRE when compared to conventional concrete specimen.
- It is found to increase drastically by 1% to 3% for 2% addition of HYBRID FIBRE when compared to conventional concrete specimen.
- The MUSA FIBRE has high cellulose content and low micro fibril angle so it is used and results that high compressive strength attained when fibre range is less than 0.5%.
- Increasing the fibre range in concrete it gives good results so the admixture range within 2% gives the desired results.

PARTIAL REPLACEMENT OF BLAST FURNACE SLAG AND CERAMIC TILES FOR COARSE AGGREGATE IN CONCRETE

A THESIS

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ABSTRACT

Concrete is a versatile engineering composite material made with cement, aggregates and admixtures in some cases. Due to the day by day innovations and developments in construction field, the global consumption of natural aggregates is very high and at the same time production of solid wastes from the demolitions and manufacturing units are also very high.. Because of this reasons the reuse of demolished construction wastes and solid waste from manufacturing came into the picture to reduce the solid wastes from demolition and manufacturing units and as well as to decrease the scarcity of natural basic aggregate. To overcome the issues many research were done to use many industrial waste as alternative or substantial material for concreting. In this project control concrete is casted for M25 grade and the partial replacement of concrete materials were decided to reuse industrial waste such as blast furnace slag and ceramics tiles as coarse aggregate replacement in range of 20%, 30%, 40% by weight of 20mm sieve size coarse aggregate. Concrete mixtures were produced, tested and compared in terms of compressive strength to the conventional concrete. These tests were carried out to evaluate the mechanical properties for 7, and 28 days. This project work is concerned with the experimental investigation on strength and mechanical properties of concrete and optimum percentage of the partial replacement by replacing 20%, 30%, 40% of ceramic waste and blast furnace slag.

CHAPTER 8

CONCLUSION

Replacement is done in concrete with ceramics tiles and blast furnace slag in coarse aggregate with different percentages of 20%,30% and 40% respectively and to find the mechanical properties of concrete. Mix design for M25 had been carried out and cube, were casted. Compressive strength can be done. Average compressive strength is obtained in conventional mix is 30.64N/mm^2 and in replacement mix 44.1394N/mm^2 and average percentage of increase in compressive strength of concrete is 27.638%.

Average flexural strength in prism is obtained in conventional mix is 5.65N/mm^2 and average split tensile strength is obtained in replacement mix is 7.189N/mm^2 average percentage of increase in flexural strength of concrete is 27.07%.Compressive strength and split tensile is increased in 20% replacement of blast furnace slag and ceramics tiles in coarse aggregate and flexural strength is increased in 30% of replacement.

Thus the mechanical strength of concrete is increased in replacing 20% and 30% blast furnace slag and ceramics tiles with coarse aggregate compared to conventional mix of concrete.

STRUCTURAL HEALTH MONITORING ON RC ELEMENT

A THESIS

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ABSTRACT

Structures like buildings, bridges, and dams are subjected to different environmental condition and their performance is likely to change with time. It is necessary to check the performance of a structure through continuous monitoring. The life of a structure depends on initial strength and the post construction maintenance. In maintenance structures are normally visually inspected by maintenance personnel. Visual inspections have several drawbacks; most obvious is that deficiencies are only detectable if they reach the surface of the structure. Also, the long intervals between inspections can reduce the safety if degradation is fast. It is the reason for the necessity of Structural Health Monitoring (SHM). SHM is an interdisciplinary engineering field that deals with innovative methods of monitoring structure. Through this SHM if any damages occur we find out before affecting the structure. Recent advantages in SHM make easier the monitoring process. In this project we create an arduino circuit and mobile application for monitoring the damage causing factors in the structure. Moisture and vibration are factors we monitor through this SHM process. In this process we use programmed sensors for collecting information from the structure. The moisture sensor used for identify the moisture penetration in the structure and vibration sensor used for monitoring vibrations on structure. The moisture and vibration sensors are placed

in the structure and connected with arduino board .The output data are received by mobile application. We use two different systems for output data transmission. First one is Bluetooth module, the mobile is connected with the SHM by Bluetooth communication. Another system is Internet of Things (IoT). With the advancement in information technology, the concept of IoT has made it possible to integrate SHM with internet to trace data anytime from anywhere. IoT is advanced platform for send and receive data from anywhere. We connect our SHM system with Iot to make it more flexible to use. We connect the arduino with Wi-Fi module for sending data through internet and mobile application is used to collect the data from internet from anywhere. IoT play major role in this process. This process makes SHM easier and simple. By these SHM process we do regular and periodic monitoring on structure and maintain the structure in good condition. The serviceability of the structure is also increases.

Keywords: Structural health monitoring, moisture, vibration, arduino, sensors, Bluetooth module, mobile application, Internet of Things.

CHAPTER 8

CONCLUSION

Structural health monitoring of structures is becoming more and more important: its ultimate target is the ability to monitor the structure throughout its working life in order to reduce maintenance requirements and subsequent downtime. Currently, visual inspection is the standard method used for health assessment of structures, along with non-destructive evaluation techniques. However, most of these techniques require a lot of manual work and a significant downtime. Thus, currently an increasing interest in SHM is rising, because it can provide cost savings by reducing the number of manual inspections. Sensor sensing are becoming desirable features in SHM systems and there has been a large development of new sensors during the last several years

Using this monitoring system we regularly monitor the moisture penetration and vibration occurs in the structure. Any moisture penetration occurs we as soon as find the damages and repaired it. The vibration sensor gives the percentage of vibration occurs on it so that we monitoring the vibration damages regularly. We avoid the whole structural failure. We use the advanced technology to monitoring the structural health. The all sensors reading are received in mobile application in one click. This process helped in detail monitoring of the structure in all environmental condition.

The SHM system with IoT is more effective for real time monitoring of structures. It helps for monitoring the structure in real time from anywhere with help of internet. The application has display the readings in percentage are easy to understand This SHM system is well adapted to application scenarios such as smart houses and smart cities, boosting on one side safety for humans and goods and on the other side reducing the costs of periodic monitoring. This SHM system monitoring the structures in 24x7 and save the reading in mobile. It is smarter and easier than conventional monitoring methods

like visual inspection. The vibration is reason for crack formation and moisture penetration is reason for corrosion of reinforcement rod, we developed SHM IoT mainly monitoring these factors so these damages are avoided in initial stages.

Future work on this IoT SHM system is making the application in different platforms with 3D model of the structure which is to be monitored. The sensor readings are displayed with node positions where we placed in structure in 3D model. And also update the sensor for monitoring the other factor which may be causing damages to structure.

PARTIAL REPLACEMENT OF LDPE POWDER BY FINE AGGREGATE IN CONCRETE

A THESIS

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INTERNAL EXAMINER

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ABSTRACT

At present the disposal of plastic in environment is becoming a major waste

CPCB data on plastic waste generation from a 2015 study showed that, in 2010-12, India generated 25,940 tonnes plastic per day. This would amount to 9.5 million tonnes per year. This paper is an experimental investigation to study the characteristic of plain concrete using LDPE powder for the partial replacement of fine aggregates. The ldpe powder is mixed with natural aggregate to prepare concrete. The concrete mix of grade M20 (i.e. 1:1.6:2.9) was adopted with water cement ratio 0.5, 5%, 10%, 15% and 20% of fine aggregate is replaced by ldpe powder. Concrete cubes and beams were casted with LDPE powder (fine aggregate). The test specimens were cured and tested for compressive strength and flexural strength as per IS specifications at 7 days and 28 days. When the LDPE powder is replaced up to definite percentage of fine aggregates, there is no decrease in strength.

CHAPTER-5

CONCLUSION

From the results and discussion, it was concluded that

- Higher content of LDPE powder replaced in concrete increases workability of concrete.
- Replacement is done in concrete with LDPE powder in fine aggregate with different percentages of 5%, 10%, 15% and 20% respectively.
- To find the mechanical properties of concrete mix design for M20 had been carried out and cubes, beams were casted.
- Using LDPE powder with 15% of replacement of fine aggregate gives higher compressive strength than normal concrete mix.
- The Flexural strength of 15% replaced LDPE powder in concrete is 9.39 N/mm^2 it is higher than conventional concrete and other dosages.
- Mechanical performances of sand concrete seem to be positively influenced by the type of plastic waste added.
- The use of LDPE powder induces a decrease of about 10-15% of density of sand in concrete.
- Plastic has more water tightness capacity when compared to natural aggregate this can help in arresting micro cracks.

EXPERIMENTAL EVALUATION OF THE MECHANICAL BEHAVIOUR OF 3D PRINTED FIBER REINFORCED CONCRETE

PHASE II REPORT

Submitted by

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MASTER OF ENGINEERING

IN

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INTERNAL EXAMINER

EXTERNAL EXAMINER

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ABSTRACT

Digital fabrication technology also referred to as 3D printing or additive manufacturing, in which a 3D object is created by laying down successive layers of materials. The currently used technology in various field is 3D printing technology. Nowadays it enters in our construction industry also. Cement concrete is the most extensively used construction material in the world. Ordinary cement concrete possesses a very low tensile strength, limited ductility and little resistance to cracking. Various types of fibers are used in the concrete to avoid these defects. In my study, 3D printed fiber is used. It is made up of PLA[Poly Lactic Acid] material and it is manufactured by using 3D printing technology. The content of 3D printed fibers as well as steel fibers were varied by 0.5%, 1% and 1.5%Cubes, cylinders and beams with 3D printed fibers were casted and the result was compared with the specimens casted with the same proportions of steel fibers. Compressive strength, Tensile strength and Flexural strength of the concrete were determined and the strength comparison between 3D printed fibers and steel fibers were recorded.

CHAPTER 10

CONCLUSION

Technology of 3D printing is still young with high expectations and hopes for the future of 3D printed buildings and building components. Based on the experimental work, the strength comparison between 3D printed fibers and steel fibers were recorded and the following conclusions are observed.

i. As the 3D printed fibers made of PLA material are introduced in concrete, it increases the strength of mechanical properties due to its high stiffness and durability.

ii. The maximum compressive strength, tensile strength and flexural strength achieved for specimens casted with 3D printed fibers are less than the strength achieved for specimens casted with steel fibers.

iii. However, the flexural strength of 3D printed fiber reinforced concrete goes on increasing with the increase in fiber content upto the optimum value.

iv. The workability decreases as the volume of fiber increases.

v. The optimum dosage of 3D printed fiber used is 1.5%.

PARTIAL REPLACEMENT OF FINE AGGREGATE BY CRUMB RUBBER IN CONCRETE

A THESIS

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ABSTRACT

At present the disposal of waste tyre is becoming a major waste management problem in the world. It is estimated that 1.2 billion of waste tyre rubber produced globally per year. It cannot be discharge off easily in the environment as its decomposition takes much time and also produces environmental pollution.

This paper is an experimental investigation to study the characteristic of plain concrete using crumb rubber for the partial replacement of fine aggregates. The crumb rubber is mixed with natural aggregate to prepare concrete. The concrete mix of grade M20 (i.e. 1:1.6:2.9) was adopted with water cement ratio 0.5, 20%, and 30% of fine aggregate is replaced by crumb rubber.

Concrete cubes were casted with crumb rubber (fine aggregate). The test specimens were cured and tested for compressive strength as per IS specifications at 7 days and 28 days. When the crumb rubber is replaced up to definite percentage of fine aggregates, there is no decrease in strength. We add crumb rubber partial replacement of fine aggregate as 20% and 30 % respectively. The compression test of concrete on 20% crumb rubber gives strength more than conventional concrete. In the same manner the strength is decreasing in 30. Hence we prefer 20% of crumb rubber replacement for aggregate to get better strength than conventional concrete.

CHAPTER-7

CONCLUSION

Fom the results of flexural strength,

- Replacement is done in concrete with crushed waste glass in fine aggregate with different percentages of 10%, 20% and 30% respectively.
- To find the mechanical properties of concrete mix design for M25 had been carried out and cubes were casted.
- Maximum compressive strength for 7 and 28 days is obtained in conventional mix is of 22.50 N/$mm2$ and 36.25 N/$mm2$.
- Maximum flexural strength of beam for 28 days is obtained in replacement mix is of 11.74 N/$mm2$ and maximum conventional mix is of 11.17 N/mm2
- With increasing of crushed glass particles into the concrete the workability should be increased gradually as compared to normal concrete.

EXPERIMENTAL INVESTIGATION ON PARTIAL REPLACEMENT OF FINE AGGREGATE BY WOOD ASH ON CONCRETE

A THESIS

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INTERNAL EXAMINER

EXTERNAL EXAMINER

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ABSTRACT

This project work intends to investigate the possibility of producing low costs enhanced performance concrete by wood ash. By taking the enormous amount of sand in river beds, it affects the environment badly and demand for fine aggregate is increase day by day. So by partially replacing Prosopis juliflora ash with fine aggregate in construction field, it can serve both the purpose of meeting the demands of construction industry and at the same time providing a green and clean environment. This expectation of partial replacement of fine aggregate by using wood ash in concrete gives the general characteristics like density, strength, workability and durability.

The conventional concrete mixture consists of cement, course aggregate, fine aggregate and water in the project wood ash is used with different percentage 0f 10%,20%,30%. The total number of 9 cubes of 150-150mm is casted using the grade of concrete M20. The mixture is prepared for concrete cubes and conduct the compressive strength on 7 days, 14 days and 28 days.

CHAPTER 8

CONCLUSION

The basic properties of materials were tested and results tabulated. The concrete mix proportions are determined by using various trial and error method. The concrete is achieved by Cement, Prosopic juliflora ash are replaced in cement at 10%,20%,30%. The concrete test are conducted and to find out the workability, Compressive strength and Flexural strength .

On comparing the results, it is understand that the concrete with 20% fine aggregate partially replaced by Prosopis juliflora wood ash gives better values than the other% of replacement. The maximum compressive strength of 20% replacement on concrete is about 23.5 N/mm^2 and the maximum flexural strength of 10% replacement on concrete is about 7.5 N/mm^2 . Which is nearly equal to the compressive strength and flexural strength of M20 conventional concrete.

Therefore in future aggregate may be replaced partially with Prosopis juliflora wood ash to reduce the cost of construction. We are trying to find the optimum proportion of the Prosopis juliflora wood ash by which one is the maximum strength achieved and the concrete will have lighting weight compared to the normal concrete and environment friendly.

EXPERIMENTAL INVESTIGATION OF LIGHT WEIGHT CONCRETE WITH PUMICE STONE AND SILICA FUME

PHASE II REPORT

Submitted by

MOHAMED ILYAS .S

In partial fulfillment for the award of degree

MASTER OF ENGINEERING

STRUCTURAL ENGINEERING

M.I.E.T ENGINEERING COLLEGE

DEPARTMENT OF CIVIL ENGINEERING

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NOVEMBER – 2019

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ABSTRACT

The project study with the special concrete such as light weight concrete by using pumice aggregate (natural aggregate) and Silicafume.One of the disadvantages of conventional concrete having high self weight. This heavy self-weight will make it to some extent an uneconomical structural material. Light weight concrete having low density, reduction of dead load and to increase the thermal insulation. The reduction in density produced by using it as a replacement of coarse aggregate partially in concrete. In this Study an attempt has been made to compare the conventional concrete and light weight aggregate concrete using mix M30. Light weight concrete is made by Partial replacement of Coarse Aggregate with different ratios of Pumice ranging from 20%, 50%, 80% and 100% and 5% of silica fume. This project is focused to determine the compression strength and flexural strength parameters of light weight aggregate concrete to find the favorable replacement with the above mentioned replacements. The results are compared with conventional concrete.

Keywords : Light weight concrete, Natural aggregate, Pumice stone, Silica fume, coarse aggregate.

CHAPTER 8

CONCLUSION

On the experimental investigations concerning the compressive strength and flexural strength of concrete, the observations and the following conclusions are drawn from the present study.

- Compression strength and flexural strength value is compared to normal concrete and replacement of Coarse aggregate by Pumice from different percentages (20%, 50%, 80%, and 100%) with 5% of Silica Fume.

- Concrete with 50% replacement of pumice the strength is comparable with normal concrete.
- Maximum value of strength is obtained in 50% replacement of Pumice with coarse aggregate and 5% of Silica fume.

- Result has to be noted that, light weight concrete having density 1500kg/m^3 and conventional concrete 2400kg/m^3.

- The increasing percentage of pumice stones will show negative impact on strength of concrete (strength decreases).

- Generally Pumice stone absorbs more water compared to the nominal coarse aggregate, to overcome this problem additional usage of silica fume is added.

- The 20%, 80% and 100% replacement of normal aggregate with pumice aggregate gives least compressive strength and flexural strength with more reduction in weight of concrete.

- With the addition of mineral admixtures, the compressive and flexural strengths of concrete are increased.
- Hence forth, 50% of replacement can be effectively used for structural purpose. Replacement of (20%, 80% and 100%) can only be used for non structural purpose.

PARTIAL REPLACEMENT FOR CEMENT IN CONCRETE BY BAGASSE ASH

A THESIS

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ABSTRACT

The basic objectives of the sustainable development are the preservation of natural resources, reduction of environmental pollution and appropriate utilization of waste materials. In case of concrete construction, these objectives can be fulfilled by partial replacement of cement and aggregates with agro waste like sugarcane bagasse ash, rice husk ash etc. and industrial waste like copper slag, steel slag, fly ash. The present study focuses on investigating the effect of Sugarcane Bagasse Ash (SCBA). This study primarily deals with the characteristics of concrete, including compressive strength and workability. mixes of concrete were prepared at different replacement levels of SCBA (0%, 5%, 10%, 15% & 20%)) with cement. The water/cement ratio in all the mixes was kept at 0.55. The workability of concrete was tested immediately after preparing the concrete whereas the compressive strength and flexural strength of concrete was tested after 7, 28 days of curing. Based on the test results, a combination of 10% SCBA is recommended.

Keywords: Compressive strength, Blended SCBA, Sugarcane bagasse ash, Workability.

CHAPTER V

CONCLUSION

In the present study, the workability, compressive strength and flexural strength of concrete containing SCBA has been investigated.It can be concluded that:

i) The blended SCBA concrete had significantly higher compressive strength compare to that of concrete without SCBA.

ii) It is found that Compressive strength and Flexural strength of concrete at 7 & 28 days increases at 10 % addition of SCBA in concrete this is due to high silica content as well as high pozzolanic reaction between calcium hydroxide and reactive silica in SCBA also improves the strength characteristics of concrete to obtain better performance.

iii) SCBA increases workability of fresh concrete, therefore use of super plasticizer is not substantial.

iv) Due to the porous structure of SCBA's particles, concrete rapidly absorbed water which reduce the Occurrence of dampness in concrete.

v) Density of concrete decreases with increase in SCBA content

vi) The slump value increases at 10%, It can be due to the porous structure of SCBA's particles which causes higher water absorption.

PARTIAL REPLACEMENT OF RECYCLED WASTE GLASS BY FINE AGGREGATE IN CONCRETE

A THESIS

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ABSTRACT

The study provides details regarding exploratory examination on the suitability of squashed glass as partially replaced for fine total in solid generation. With the use of waste glasses available around the world at low costs, the use of Waste Glass seems to offer the best short term solutions for rising river bed and demand. The global warming is caused by the emission of green house gases, such as CO_2, to the atmosphere. Among the greenhouse gases, CO_2 contributes about 65% of global warming. The global cement industry contributes about 7% of greenhouse gas emission to the earth's atmosphere. In order to address environmental effects associated with cement manufacturing, there is a need to develop alternative binders to make concrete. Efforts have been made in the concrete industry to use waste glass as partial replacement of coarse or fine aggregates and cement. In this study, finely powdered waste glasses are used as a partial replacement of fine aggregate in concrete and compared it with conventional concrete. The objective of this project work is to study the effects of using waste glass as partial replacement for fine aggregate. Different concrete mixes were prepared by varying the amounts of crushed waste glass. The waste glass was used to replace fine aggregate in the proportions of 10% , 20% , 30% and 30% , 40% , 50% .The study indicated that waste glass can effectively be used as fine aggregate replacement without substantial change in strength.

CHAPTER 7

CONCLUSION

This experimental study sought to identify the effects of implementing waste glass as a partial replacement for fine aggregate in structural grade concrete. The results obtained demonstrate that doing so can in fact 'add value', and in conjunction with environmental legislation focusing on sustainable building development, may act as an incentive for the construction industry to incorporate this waste material into their practices. Based on the investigation and experimental results, the following conclusions can be made

Replacement is done in concrete with crushed waste glass in fine aggregate with different percentages of 10%, 20% and 30% respectively. For flexural strength the replacement mix should be 30%, 40%, 50% respectively.

- To find the mechanical properties of concrete mix design for M25 had been carried out and cubes & beams were casted.
- Maximum compressive strength for 7 and 28 days is obtained in conventional mix is of 22.50 N/mm^2 and 36.25 N/mm^2.
- Maximum compressive strength for 7 and 28 days is obtained in replacement mix is of 26.25 N/mm^2 and 42.25 N/mm^2.
- Maximum flexural strength of beam for 28 days is obtained in replacement mix is of 12..32 N/mm^2 and maximum conventional mix is of 11.43 N/mm^2
- Crushed glass replaced as fine aggregate into the concrete the compressive strength and flexural strength should be increased up to 20% and 40% replacement level and after 30% and 50% replacement level it goes to decreasing.
- There exist high potential for the use of crushed glass as fine aggregate into the concrete for the saving of natural aggregate.

EXPERIMENTAL STUDY ON PARTIAL REPLACEMENT OF CEMENT AND FINE AGGREGATE WITH CERAMIC POWDER AND COPPER SLAG

A THESIS

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ABSTRACT

Increase in industrialization and urbanization, the use of buildings also increased which results in continuous usage of construction material leads to scarcity of the concrete materials. To overcome the issues many research were done to use many industrial waste as alternative or substantial material for concreting. Concrete, a homogeneous mixture of cement, fine aggregate, coarse aggregate and water is widely been used in construction activities. But cement and fine aggregate are becoming consequently costlier and their demand also increases every day. More studies were carried out replacing cement but ceramic powder and replacing fine aggregate by copper slag separately. From the literature review we can to know maximum percentage of replacement of ingredients. In this study, different mix proportions were carried out by replacing different percentage of ceramic powder and copper slag. From the experimental results, it was observed that compressive strength was increased about 35.80% when compared to conventional concrete.

CHAPTER 7

CONCLUSION

The above experimental data shows that addition of the ceramic powder and Copper slag improves the physical and mechanical properties. These results are of greater importance because this kind of innovative concrete requires large amount of fine particles. As cement cost is going on increasing trend and fine aggregate demand is increasing day by day, the replacement of ceramic powder and copper slag for cement and fine aggregate proves to be economical and an also provides an efficient utilization industrial waste. From the above study, it is concluded that the ceramic powder and copper slag for cement and fine aggregate may be used as a replacement material.

The replacement of cement and fine aggregate with ceramic powder and copper slag gives an excellent result in strength aspect and quality aspect. In this study, the percentage of cement and percentage of fine aggregate is replaced with ceramic powder and Copper slag with different proportions. From the result it was found to be very effective in compression strength and flexural strength when compared with nominal concrete.

The results shows for the above replacement, there is an increase in compressive strength achieved by 36 % of nominal mix (M25).

From the experimental studies, it is suggested that replacement of cement and fine aggregate by ceramic powder for 20% and Copper slag for 40% is effective and can be used in the construction activities.

The flexural strength of concrete is done at 28 days is higher than the designed mix. The flexural strength of the concrete will have increased strength for all percentage of replacement compared to the conventional concrete.

Durability of concrete depend on Rapid Chloride Penetration Test gives the corrosion due to rate of chloride ion passing into the concrete. As per ASTM C1202 the values obtained for all partial replacement, the chloride rate result graded under "moderate".

EXPERIMENTAL STUDY OF STRENGTH PROPERTIES BY PARTIAL REPLACEMNT OF CEMET AND FINE AGGREGATE WITH METAKAOLIN AND IRON SLAG IN CONCRETE

A THESIS

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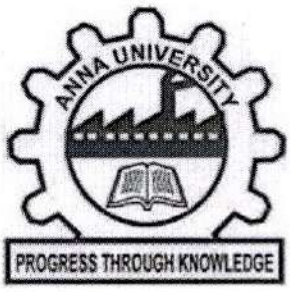

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ABSTRACT

Concrete is the most commonly used material for development of infrastructure. Due to heavy production of cement environmental gets damages. Due to manufacture of cement ,CO2 gets emitted into environment. Researches started on working partial replacement cement .Which occur naturally, manufactured or manmade waste. The utilization of Metakaolin in concrete element by replacing it partially in cement.

Steel slag is produced locally in great amount which leads in causing many environmental problems alike natural depletion when disposed. This work includes the determination of different properties of locally available steel slag. The utilization of steel in the concrete element by replacing it partially with fine aggregate .

The replacement cement with Metakaolin and fine aggregate with steel slag by 10%,20%,30%. Then the flexural strength have been obtained.

CHAPTER 7

CONCLUSION

This experimental study sought to identify the effects of implementing waste glass as a partial replacement for fine aggregate in structural grade concrete. The results obtained demonstrate that doing so can in fact 'add value', and in conjunction with environmental legislation focusing on sustainable building development, may act as an incentive for the construction industry to incorporate this waste material into their practices. Based on the investigation and experimental results, the following conclusions can be made

- Replacement is done in concrete with crushed waste glass in fine aggregate with different percentages of 10%, 20% and 30% respectively.
- To find the mechanical properties of concrete mix design for M25 had been carried out and cubes were casted.
- Maximum compressive strength for 7 and 28 days is obtained in conventional mix is of 22.50 N/$mm2$ and 36.25 N/$mm2$.
- Maximum compressive strength for 7 and 28 days is obtained in replacement mix is of 26.25 N/$mm2$ and 42.25 N/$mm2$.
- Maximum flexural strength of beam for 28 days is obtained in replacement mix is of 12..01 N/$mm2$ and maximum conventional mix is of 11.01 N/mm2
- With increasing of crushed glass particles into the concrete the workability should be increased gradually as compared to normal concrete.

AN EXPERIMENTAL STUDY ON CONCRETE WITH PARTIAL REPLACEMENT OF CEMENT AND FINE AGGREGATE AS RICE HUSK ASH

A THESIS

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ABSTRACT

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. Cement is the most expensive constituents of concrete. Over 5% of global CO_2 emission is attributed by cement production. Similarly due to the demand in the fine aggregate. In this work alternate source for CEMENT and FINE AGGREGATE as RICE HUSK ASH (RHA) is used. RHA is a good pozzolan. RHA also acts as filler causing the concrete to become denser while retaining its unique low density. RHA under controlled temperatures below 800°C. The burning process produces about 25% of ash containing 85% to 95% amorphous silica as well as about 5% alumina, which makes it highly pozzolanic. Studies have thoroughly investigated the mechanical properties and behaviour of concrete.

RHA can enhance the durability of concrete particularly in terms of environmental exposure and chemical attacks. The highly reactive silica in RHA had a significant effect on the tobermorite transformation. This super pozzolana to make special concrete mixes. A comparative study on properties of concrete when cement and fine aggregate are partially replacement by RHA. Percentage replacement of cement with RHA is kept as constant at 10% and fine aggregate with RHA, is at 10%, 15% and 20% in a mix of M20 grade of concrete. It is used for reduce the cost of construction and increase the strength of the concrete. It also be used to attain a high strength and stiffness with low component weight. To find the compressive strength and flexural strength of concrete for 7, 14 and 28 days. The strength is compare with conventional concrete and the optimum% of replacement of RHA.

CHAPTER 10

CONCLUSION

The conclusion is arrived from this project, by finding optimum percentage of addition of Rice husk ash. The basic of this investigation is to find the suitability of use of RHA as partial replacement of cement and fine aggregate. All the materials tests were conducted in the laboratory as per relevant Indian Standard Codes. Basic tests were conducted on the cement, fine aggregate and coarse aggregate and RHA, to check the suitable for concrete making. All the concrete cubes and beams were tested and results obtained.

CONCLUSION

- The RHA is the waste material which is cheap and easily available is made an effective filler materials to use in concrete.
- The average compressive strength results at 28 days for different addition levels such as 10%, 15% and 20% of Rha is 23.87 N/mm^2.
- The average flexural strength results at 28 days for different addition levels such as 10%, 15% and 20% of Rha is 19.5 N/mm^2.
- The maximum flexural strength is obtained when 10%, 15% and 20% Rice Husk Ash was replaced with cement and fine aggregate. It is equal to conventional concrete.
- Moreover, with the use of RHA, the weight of concrete reduces, thus making the concrete lighter which can be used as light weight construction material.
- As the RHA is waste material, it reduces the cost of construction.

EVALUATION OF PROPERTIES OF CONSTRUCTION MATERIALS USING INTERNET OF THINGS

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ABSTRACT

IoT means "Intelligent interactivity between human and things to exchange information and knowledge for new value creation". Small things connect the internet communication the information. It is the modern technology. IoT is a combination of different technologies like wireless sensor network, data networking and cloud computing. The IoT brings new opportunities for our society. The Internet of Things (IoT) is a convergence of smart devices that generate data through sensors to create new information and knowledge to boost human intelligence, efficacy and productivity to enhance the quality of life. The main objective of this study is evaluation and monitoring of properties of construction materials using IoT.

CHAPTER 6

CONCLUSIONS

The recently developed technologies in structural engineering needs to be an automation system. IoT has a wide range applications in the civil engineering field. Structural Health Monitoring is the appearing field in civil engineering which offer the potential for continuous and periodic assessment of the safety and integrity of civil infrastructures. It includes process of identifying weakness of damages in the infrastructures due to any reason , well in time so that a preventive maintenance can be undertaken before it collapses. It is easily achieved by using IoT. It can also give warning about current state of the structure. The main aim of performing IoT structural engineering is to monitor structural health and the problems are easily identified and rectified by using proper rectifying method.

EXPERIMENTAL BEHAVIOUR ON CONCRETE PROPERTIES USING ZEOLITE AS A PARTIAL REPLACEMENT OF CEMENT WITH NATURAL ADMIXTURE

A THESIS

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ABSTRACT

The implementation of alternative cementitious material is very imperative because at the present time global warming is the current serious matter and carbon -di -oxide is one of the harmful gases which causes global warming. Concrete consisting of cement releases carbon- di -oxide during manufacturing process. Hence,it is crucial time to find out the alternative material for cement and it should be promising, environment friendly material to reduce the CO2[11] and improving the concrete characteristics, with considering the other benefits like low cost and easy availability.Zeolite is a material which possess pozzolanic properties and found to be satisfying the above criteria for the replacement of cement. To increase the workability of concrete in general, mineral and chemical admixtures are always used to reduce the water content in order to obtain high strength.These admixture is relatively expensive.So, shifting ourselves to use eco friendly (natural) admixtures in concrete is needed. For this reason, Aloe vera juice which is obtained from aloe vera plant is preffered as a natural admixture.This paper highlights about the behaviour of zeolite and aloe vera in concrete in 20%,25%,30% of zeolite for the replacement of cement along with 2% of aloe vera juice.The strength behaviour is studied in both river sand and M-sand with zeolite and test results are compared .Overall incorporation of zeolite in 25% in river sand and 20% in Manufacturing sand gives enhanced strength.

CHAPTER-9

CONCLUSION

Based on experimental work reported in this investigation, the following conclusions can be noted as below,

- ✓ The incorporation of zeolite in concrete as a partial replacement of cement showing higher compressive strength in 25% replacement in concrete made with river sand and 20% in M- sand made concrete when compared with conventional concrete.
- ✓ Increase in compressive strength is also enhanced due to the addition of natural admixture aloe vera juice.
- ✓ The compressive strength of concrete made with zeolite and natural admixture was found to be more than 15% (R-Sand) and 6% (M- Sand) of conventional concrete at the age of 28th day.
- ✓ The zeolite made concrete is capable of absorbing CO2 without any emission of it. The zeolite concrete block of size 150x150x150 mm has ability to absorb around 0.5 mole of CO2 in 28 days. This property does not lose its strength and durability.Increase in zeolite leads to increase in CO2 absorption.
- ✓ Thus the experimental behaviour on concrete using zeolite as a partial replacement of cement with natural admixture is studied successfully.

BEHAVIOUR STUDIES ON HIGH VOLUME RICE HUSK ASH IN CEMENT AND ADDITION OF STEEL FIBERS IN CONCRETE

PHASE II REPORT

Submitted by

D.SHRIVIDHYA

In partial fulfillment for the award of degree of

MASTER OF ENGINEERING

IN

STRUCTURAL ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

M.I.E.T ENGINEERING COLLEGE: TRICHY-7

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SEPTEMBER 2020

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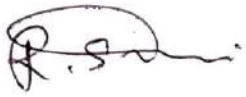

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INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

Rice husk ash is a material that can play a similar role to silica fume as a pozzolanic material in concrete. RHA which are residues from de-husked paddy rice. In this project high volume rice husk ash as a partial substitution for cement mix M30 has to be studied. The study was conducted to evaluate the characteristics of the HVRHA with steel reinforced concrete. The concrete mix design was done for M30 grade concrete. However the specimens have been tested for 0.50 w\c ratio and it is arrived from the slump test. Mix was prepared for different combinations (30%), (40%),(50%)of RHA with steel content of (1.0%, 1.5%, 2.0%). the specimen such as cubes, cylinders and beams were casted and evaluate the properties such as compressive strength, split tensile strength, flexural strength and characteristics of beams has been analyzed, and it has been compared with the control mix for a duration of 7& 28 days.

KEY WORDS: Rice husk ash, Steel fiber, Silica fume, Pozzolonic materials.

CHAPTER 7
CONCLUSION

From the experimental work done, it is concluded that the rice hush ash can be used as partial replacement material for cement and addition of steel fibers in concrete. Due to rice husk ash it is proved to be very effective in assuring very good cohesiveness of mortar and concrete .It is showed that 30% of rice husk ash and 1.5 % of steel fibers gives an excellent result in strength aspects and quality aspects and it is also better than the conventional concrete. Further increase in % of rice husk ash and % of steel fibers decreased the compressive, tensile and flexure strength of the specimens. The results show that the substitution of 30% of cement content by rice husk ash with 1.5 % of steel fibers induced higher compressive strength, higher split tensile strength and higher flexure strength.

PARTIAL REPLACEMENT OF CEMENT WITH CALCIUM BENTONITE IN CONCRETE

A THESIS

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ABSTRACT

The main aim of this project is to search an alternative of cement and to represent an experimental study on the properties of compressive strength and durability of concrete with the replacement of cement with calcium Bentonite (10%,20%,30%). Partially portlant cement and evaluate the impact of these materials on the strength characteristics of concrete. Many of the developing countries are replacing the materials with the materials which are recycled so as to minimize the environmental hazards and safe guarding the natural resources. The increase in strength of bentonite mixes is due to the increase in age and not due to the durability attacks. Cubes and cylinders were casted with M20 design mix and compressive, split tensile strength were studied for 7, 14, 28 days and compared with conventional concrete based on the test results, the various strengths were identified.Based on the test results, the compressive strength for 28days of 10% replacement is attained strength 3% increased respectively. The Split tensile strength is gradually increased for 28days of 10% replacement is increased strength by 0.7%. Based on the water absorption test, the Bentonite 30% absorp less water when compared with conventional concrete.

CHAPTER 6

CONCLUSION

6.1 GENERAL

This chapter deals with the conclusion of present study.

6.2 CONCLUSION

- Cement is the most widely used construction material in the world and important product in concrete as compared to other.
- Based on the test results, the compressive strength for 28days of 10% replacement is attained strength 3% increased respectively.
- The Split tensile strength is gradually increased for 28days of 10% replacement is increased strength by 0.7%.
- Based on the water absorption test, the Bentonite 30% absorp less water when compared with conventional concrete
- The percentage expansions of the specimens cast with partial replacement of Bentonite are within the permissible limits. Hence the materials are safe for construction purpose. Use of Bentonite increases the strength and durability of concrete for construction.
- The flexural strength is gradually increased for 28 days of 20% replacement is increased strength by 1%.

PERFORMANCE EVALUATION ON PARTIAL REPLACEMENT OF CEMENTITIOUS MATERIAL WITH NANO SILICA AND GGBS

A THESIS REPORT

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ABSTRACT

This project is aimed to partial replacement of cement by cementitious material Ground Granulated Blast Furnace Slag and Nano silica in concrete. Nano silica is the first Nano product that has replaced in concrete for cement. GGBS is the cementitious material is also replaced in concrete for cement in various percentage. Mainly this materials replacement is to reduce the co_2 emission and consequence the greenhouse effect. The cementitious material GGBS will be used as 10%, 20%, 30%, 40%, 50% and Nano silica is 2% constant by the weight of cement. For this proportion compressive strength and split tensile strength is calculated for M_{30} grade of concrete. This project is also aimed to increase the strength and durability of concrete.

CONCLUSION

- AnalyticTests results show that the incorporating10%, 20%30% GGBS and constant 2% Nano silica replacement shows highly significant to increase the compressive strength of concrete after 28 days respectively.

- The partial replacement of OPC with GGBS and Nano silica improves the workability but causes a decrease in the plastic density of the concrete. The compressive strengths increases with increasing GGBS and constant Nano silica replacement content.

- Based on the results, the most optimum mix is the one with 20%GGBS and constant 2% Nano silica for OPC in concrete.

- all investigation has been carried out and results show that the structural behaviour of Trial 2 model has been similar to that of the experimentally predicted one.

- The analytical value for Trial 2 mix raised 11% more than conventional concrete.

- The maximum deflection measured from the experiment at the loading point of the beam for the Conventional and replacement of Trial 2 & 3 are 5.18mm, 6.52mm, and 5.54mm respectively at the ultimate load levels.

- The study shows that an appropriate numerical simulation of specimens can be able to predict a considerably close response as that was obtained from the experimental studies.