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GREEN CONCRETE

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ABSTRACT

Global warming is the one of the major threats to the environment till date, Production of concrete is one of the vital factors for global warming as it accounts 30%of the total co2 released in the atmosphere.This can be minimised by eco-friendly substitute known as green concrete.A concrete that made with concrete waste like slag power plant, waste ,recycled concrete minning &quarrying wastes ,waste glass etc. and uses less energy in its production and uses less carbon dioxide than normal concrete

Keywords: concrete,fly ash,sand,blast furnace slag.

1INTRODUCTION

Green concrete is the revolutionary topic in the history of concrete Industry. This was first invented in Denmark in year 1998.Green concrete is the type of concrete which is much like the Conventional concrete but the production of such concrete requires minimum amount of energy and causes least harm to environment.Green concrete has nothing to do with colour.it is a concept of thinking eco-friendly environment. The main ingredient in concrete is cement and it consist of limestone, during manufacture of cement its ingredient are heated to about 800-1000c.during this process the carbon Dioxide is driven off and approximately 1kg of cement release about 900gms of carbon Dioxide, therefore green concrete came into existence to reduce the emission of carbon Dioxide.

2 Material

2.1 Fly ash:-

Fly ash is a by-product produce during the operation of coal fired power plants. The finely divided Particles the exhausted gases are collected in electrostatic precipitators. These particles are called fly ash.

Advantage of using fly ash in concrete

1. Utilization of fly ash as a partially replacement of cement or as a mineral admixture in concrete Saves on cement and hence the emission CO_2.

2. Use of good quality fly ash in concrete has shown remarkable improvement in durability of concrete, especially in aggressive environment.

Some of the technical benefits of the use of fly ash in green concrete:-

1. Higher ultimate strength.
2 .Increased durability.
3. Improved workability.
4. Reduce bleeding.
5 .Increased resistance to alkali silica reactivity.
6 .Reduce shrinkage

2.1 Blast furnace slag:-

Blast furnace slag cement is the mixture of ordinary Portland cement and fine granulated blast furnace slag obtained as a by-product in the manufacture of steel with percent under 70% to that of cement. Ground granulated blast furnace slag cement (GGBFS) is a fine glassy granules which contain cementiousproperties.In this article we discuss about the manufacture, constituents, properties, uses, advantages and disadvantages of Blast-furnace slag cement.

Table1.Constituents of Blast furnace slag

Constituent	%by mass
SiO_2	27-49%
Al_2O_3	8-20%
CaO	38-50%
MgO	<10%

2.2 Recycled concrete :-

Recycled aggregate is produced by crushing concrete, and sometimes asphalt, to reclaim the aggregate. Recycled aggregate can be used for many purposes. The primary market is road base aggregate Crushed concrete may be reused as an aggregate in new Portland cement concreteor any other structural layer. Generally it is combined with a virgin aggregate when used in new concrete. However, recycled concrete is more often used as aggregate in a sub-base layer. Construction and Demolition disposal has emerged as a major problem in all over the world. In USA, approximately 135 million tons of Construction and Demolition waste is generated annually. Wastes' arising from construction and demolition constitutes one of the largest streams within the European Union and many other countries. It is now widely accepted that there is significant potential for reclaiming and recycling demolished debris for use in value added applications to maximize economic and environmental benefits. As a result recycling industries grew up. Many governments throughout the world have now introduced various measures aimed at reducing the use of primary aggregates and encouraging reuse and recycling, where it is technically, economically, or environmentally acceptable. Recycling industries in many parts of the world converts low value waste into secondary construction material such as aggregate grades, road materials and aggregate fines. While accepting the need to promote the use of Recycled Concrete Aggregate (RCA) in wider applications, it must be remembered that the aggregate for concrete applications must meet the requirements set in relevant specifications for its particular use. The gap between these interests has to be reduced in steps that are manageable and the use of RCA in structural concrete has to be promoted gradually. Similarly considerable attention is required to the control of waste processing and subsequent sorting, crushing, separating and grading the aggregate for use of the concrete construction industry. In addition, there is an urgent need for legislative or regulatory measures to implement sustainable Construction & Demolition waste management strategy and encourage recycling for use in value added applications. A number of different processes are possible for the crushing and sieving of Construction & Demolition waste. Such material often contains foreign matter in the form of metals, wood, hardboard, plastics, papers etc. Hence, a process scheme has to be adopted which removes large pieces of these materials, mechanically or manually, before crushing and thorough cleaning of the crushed product.

2.3 Quarry Dust:-

Common river sand is expensive due to excessive cost of transportation from natural sources. Also large-scale depletion of these sources creates environmental problems. As environmental transportation and other constraints make the availability and use of river sand less attractive, a substitute or replacement product for concrete industry needs to be found. River sand is most commonly used fine aggregate in the production of concrete poses the problem of acute shortage in many areas. Whose continued use has started posing serious problems with respect to its availability, cost and environmental impact. In such a situation the Quarry rock dust can be an economic alternative to the river sand. Quarry Rock Dust can be defined as residue, tailing or other non-voluble waste material after the extraction and processing of rocks to form fine particles less than 4.75mm. Usually, Quarry Rock Dust is used in large scale in the highways as a surface finishing material and also used for manufacturing of hollow blocks and lightweight concrete prefabricated Elements. Use of Quarry rock dust as a fine aggregate in concrete draws serious attention of researchers and investigators. In the recent past good attempts have been made for the successful utilization of various industrial by products (such as fly ash, silica fume, rice husk ash, foundry waste) to save environmental pollution. In addition to this, an alternative source for the potential replacement of natural aggregates in concrete has gained good attention. As a result reasonable studies have been conducted to find the suitability of granite quarry dust in conventional concrete. The utilization of Quarry rock dust which can be called as manufactured sand has been accepted as a building material in the industrially advanced countries of the west for the past three decades

The use of manufactured sand in India has not been much, when compared to some advanced countries.

1. The durability of quarry dust concrete under sulphate attack is higher compared to conventional concrete

2. The durability of quarry dust concrete under acid action is also better than conventional concrete.
3. The effects of quarry dust on the elastic modulus property are good with conventional concrete containing natural sand.

The fine quarry dust tends to increase the amount of super plasticizers needed for the quarry mixes in order to achieve the rheological properties. Replacement of natural sand with Quarry Rock Dust, as full replacement in concrete is possible. However, it is advisable to carry out trial casting with Quarry Rock Dust proposed to be used, in order to arrive at the water content and mix proportion to suit the required workability levels and strength requirement. However, more research studies are being made on Quarry Rock Dust concrete necessary for the practical application of Quarry Rock Dust as Fine Aggregate.

2.4 **Glass Aggregate:-**

The concrete industry places a heavy demand on primary aggregate sources; it is estimated that 165 million tonnes are used annually. There is therefore considerable incentive to develop alternative aggregate sources based on waste materials.Crushed recycled glass can be used as a complete fine aggregate replacement in concrete, while finely ground glass (powder) has pozzolanic properties. Research has shown that when glass powder is used at percentages greater than 20% of mass of cement, the pozzolanic reactions suppress ASR. When recycled glass is used as an aggregate, the risk can be minimised through the use of ground-granulated blast furnace slag. glass particles were also used as fine aggregate in glass concrete to make a suitable colour distribution in some mixes. Pigments were added to produce coloured architectural concrete. Beside, superplasticiser (SP) was used to reduce the amount of water required and to obtain good workability.

Advantages of Green concrete:-

1.Reduction of the concrete industry's CO2-emmision by 30 %.
2.Increased concrete industry's use of waste products by 20%.
3. No environmental pollution and sustainable development.
4.Green concrete requires less maintenance and repairs.
5. Green concrete having better workability than conventional concrete.
6.Good thermal resistant and fire resistant.
7. Compressive Strength, flexural strength & behaviour of green concrete with water Cement ratio is similar to conventional concrete.
8. Reduce the dead weight of a structure is of 5 tons to about 3.5 tons.

DISCUSSION & CONCLUSION:-

1. Green concrete having reduced environmental impact with reduction of the concrete industries Co2 –emissions by 30%.
2. Green concrete is having good thermal and fire resistant.
3. In this concrete recycling use of waste material such as ceramic wastes, aggregates, so increased concrete industry's use of waste products by 20%. Hence green concrete consumes less energy and becomes economical.
4. Green concrete requires less maintenance and repairs.
5. Green concrete having better workability than conventional concrete.

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