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EXPERIMENTAL STUDY OF CONCRETE PARAMETER REPLACING CEMENT AND SAND BY FLY ASH WITH FIBRE

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Abstract
The optimisation of mixture proportions for high performance concrete which contain many constituent and are often subjected to several performance constrain, can be difficult and time consuming task. Statistical experiment design and analysis method have been developed specifically for the purpose of optimizing mixture, such as concrete in which the final product properties depend on the relative proportion of the components rather than their absolute amounts. Statistical mixture experiment was used to optimize a six component mixture subjected to several performance constraints. The experiment was performed in order to assess the use fulness on this technique for high performance concrete mixture proportioning in general.

1. Introduction

Concrete is the most widely used building material in the world due to its versatility, low and durability. Fine aggregate is an essential component of concrete. The most commonly fine aggregate is natural river sand. The demand for natural sand in the construction industry has consequently increased due to the extensive use of concrete resulting in the reduction of sand sources and increase in price. Natural sand takes millions of years to form and is not replenishable. Because of its limited supply and excessive cost of transportation from natural sources the cost of natural sand has sky rocketed and its consistent supply cannot be guaranteed. The large scale depletion of these sources also creates environmental problem! failure of river banks, lowering of river beds, damage to the bridge foundations and other structure situated closer to the rivers, saline water intrusion into the land and coastal erosion are the major adverse effects due to intensive river sand mining. The Government already banned sand mixing due to environmental problems in some identified areas of major river. Therefore it becomes necessary to explore the possibility for alternative sources to minimized river sand extraction .Thus an investigation needed to identify a suitable substitute that is eco-friendly and inexpensive and in this this connection the use of quarry dust as fine aggregate has occupied a promosing factor in the preparation of concrete .The

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utilization industrial waste or secondary material has encourage the production of cement and concrete in the construction field. Dumping and disposal of waste material cause environmental and health problem. Therefore recycling of waste material is a great potential in concrete industry. For many years by product such as fly ash silica flume, and slag consider as waste material. Concrete prepared with such materials showed improvement in woltability and durability compared to normal concrete and has been used in the construction of power. chemical plants and under-water structures. over recent decades, intensive research studies have been carried out to explore all possible reuse method Construction waste, blast furnace. steel slag, coal fly ash and bottom have been accepted in many places as alternative aggregates in embankment, roads -pavement and foundation and building construction ,Raw material in the manufacture of ordinary Portland cement.

2. Research Method

Experimental programme was designed to study the effect of partial replacement of cement and sand by class F fly ash in concrete with different percentage. The replacement levels of cement with class F fly ash have been varied 0% to 2.5% are used for each fly ash concrete mix to study the mechanical properties of fibre reinforced concrete .For each mix proportion nine concrete cubes casted mixes and over all fly ash concrete mixture and fibre concrete mixes have been cast and tested for finding out the mechanical properties of concrete at 7,14,and 28 days of curing. The present work has been carried out to study the mechanical characteristics such as compressive strength for each fly ash concrete and fly ash fibre concrete mixture.

Material use for casting The material are used in the experimental work namely cement, fine aggregate and coarse aggregate (20mm down and 12.5 mm retained) and class F fly ash have been used for casting the required specimen according to the IS code for different mix properties .

3. Results and Analysis

Series of test are carries out on the concrete specimen to obtain the strength characteristics of class F fly ash concrete mix .The chapter discussed on the results that obtained from the experimentation .The result such as compressive test on concrete cube fly ash replacement to cement and sand with varying percentage ,the age of concrete and strength of concrete with replacement of flt ash ,the effect of steel fibre on replacement of flt ash with cement and filler material have been discussed.

The compressive strength of concrete has been evaluated by testing three cubes of size 150 mm×150mm×150mm at the edge of 7,14,and 28 days .After casting of specimen they are kept in the mould for 24 hours at a room temperature .After 24 hours the cubes were removed from the moulds and immersed in clean fresh water until taken out for testing.

The compressive strength is evaluated by placing a cube specimen between the loading surfaces of the compressive testing machine of capacity 2000 KN .The load is applied until failure of the specimen takes place .The compressive strength is determine by the ratio of crushing load to the area of cross section cubical specimen .The compressive strength of concrete mixture is determined for all the specimen of concrete mixes at the ages of 7,14,and 28 days .The effect of percentage of fly ash replacement volume fractions of polypropylene fibres on the compressive strength of concrete has been discussed in the following section

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4. Conclusion

The experimental work has been carried out on the fly ash concrete mixes as replaced of cement and sand with and without steel fibre. The replacement of class F fly ash at various levels and different percentage of steel fibre has been adopted for each concrete mix. The steel fibres have been added at 0.5%,1.0%,2.0%.and 2.5% volume fraction to the fly ash concrete mixes .The following conclusion are drawn based on the experimental result and analysis of test result

The literature survey carried out led to identification of the need for conducting the feasibility study of producing class F fky ash concrete with fibres.

It is probable that even higher percentile replacement of cement would still be able to provide the same compressive strength as no fly ash (the fineness of fly ash and the high lime amounts provides a much better hydration process of the pozzolanic reaction ,hence increased strength gain).However ,the result of this study do not indicate at which the point the continued replacement of cement with fly ash would cause the compressive strength to decline below the strength observed from the no-fly ash concrete.

Increasing percentage of fly ash in concrete reduces the early strength gain of concrete

A 30-40% fly ash replacement provide the most optimal (best possible) strength result beyond 40% fly ash replacement ,the rate of gain of compressive strength decreased at 7 days maintains

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