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A review on investigation of the strength & properties of concrete by partially replacement of cement with fly ash and GGBS

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ABSTRACT

The objective of this research work is to reduce the cost of the construction. Now days the industrial wastes are rapidly increasing. To utilize such materials and to reduce such type of waste in environment, the cement is replaced by the wood ash. FLY ASH and GGBS limited to the grain size of less than 90 micrometer is added to cement by weight percentage of 0%, 5%, 7.5%, 10%, 12.5% and 15% by the method of replacement by weight. The samples were hydrated at different time intervals ranging from one hour to 4 weeks. From this research the results are much better as compared to ordinary Portland cement. These tests were carried out to evaluate the strength properties for 7, 21 and 28 days.

Key words: Specific gravity test, workability test, compressive strength, FLY ASH and GGBS.

INTRODUCTION

Cement is the widely used material in the world for various construction purposes but during manufacturing of cement lot of dangerous gases are released such as carbon monoxide and carbon diaoxide in the same way the hazardous waste such as highly alkalined materials and volatile organic compounds. Due to these hazardous waste the different types of diseases are caused and it also cause problem in eco-system which leads to environmental imbalance .in this way by using supplymentary cementious material we can reduce the environmental imbalance and maintain the eco-system in the good way.

METHODOLOGY

1 CEMENT

Ordinary Portland Cement (43 Grade) with specific gravity of 2.9 was used for this experimental investigation. The testing of cement is done as per IS-4031-11-1998.

2 AGGREGATES

Aggregates are the important constituents in concrete. They give body to the concrete, reduce shrinkage and effect economy. One of the most important factors for producing workable concrete is a good gradation of aggregates. Good grading implies that a sample fraction of aggregates in required proportion such that the sample contains minimum voids. Samples of the well graded aggregate containing minimum voids require minimum paste to fill up the voids in the aggregates

3 FINE AGGREGATE (NATURAL RIVER FINE AGGREGATE):

The river sand is used in combination as fine aggregate conforming to the requirements of IS: 383. The river sand is washed and screens, to eliminate deleterious materials and oversize particles. Those fractions from4.75mm to 150microns are termed as fine aggregate. Locally available river sand having density of 1550 kg/m 3 and fineness Modulus (FM) of 5.02 was used. The specific gravity was found to be 2.62. The fine aggregate was found to be confirming to Zone III as per IS 383:1970. The specific gravity of fine aggregate is obtained by using the IS-2720-part 3 code.

4 COARSE AGGREGATE

The fractions from 20mm to 4.75mm are used as coarse aggregate. The Coarse Aggregates from crushed Basalt rock, conforming to IS: 383 is being used. The Flakiness and Elongation Index were maintained well below 15%. Natural granite aggregate having density of 1500 kg/m3 and fineness modules (FM) of 3.14 was used. The specific gravity was found to be 2.69 and maximum size of aggregate was 20mm. The specific gravity of coarse aggregate is obtained by using the IS-2386-part 3-1963 code.

5 FLY ASH

Fly ash is the material which is formed during the pulverizing and combustion of coal which contains 80% of fly ash. It is a cementioues material which is used in the place of cement in measured quantity for higher strengt

6 GGBS

Ground Granulated Blast Furnace Slag is the material which is formed from blast furnace used to make iron. It is a supplementary cementious material which is used in constructions. The specific gravity of ground granulated blast furnace slag is 2.53.

7 WATER

Generally, water that is suitable for drinking is satisfactory for use in concrete. Water from lakes and streams that contain marine life also usually is suitable. When water is obtained from sources mentioned above, no sampling is necessary. When it is suspected that water may contain sewage, mine water or wastes from industrial plants or canneries, it should not be used in concrete unless tests indicate that it is satisfactory. Water from such sources should be avoided since the quality of the water could change due to low water or by intermittent tap water is used for casting. The potable water is generally considered satisfactory for mixing and curing of concrete. Accordingly potable water was used for making concrete available in Material Testing laboratory. This was free from any detrimental contaminants and was good potable water.

8 Kerosene

Kerosene (kerosene), also called paraffin or paraffin oil, is a flammable pale yellow or colorless oily liquid with a characteristic odor intermediate in volatility between gasoline and gas/diesel oil that distills between 125°C. Specific gravity of kerosene is 2.7. In this investigation we are using M30 grade mix design. And extra 10% of materials were added, because the mixing is not properly.

SCOPE & OBJECTIVE

• SCOPE

The use of fly ash and GGBS as a replacement of cement not only extends technical advantages to the properties of concrete but also contributes to the environmental pollution control. The fly ash is obtained from the thermal power plant, by burning the coal. The GGBS is obtained as a by-product from iron and steel making industry these we can reduce the disposal problem of fly ash and GGBS.

• OBJECTIVE

To use industrial waste GGBS for the manufacture of concrete which otherwise would have been a disposal. To reduce the quantity of cement in manufacture of concrete by partial replacement of cement with silica fumes. To reduce the cost of concrete.

CONCLUSIONS

Based on limited study carried out on performance of GGBS and silica fumes concrete in comparison with normal concrete of design strength.

1. Large percentage of low calcium fly ash provides concrete with high permeability against the passage of chloride ions, better durability and low dilatation.

2. Fly ash used as cement replacement in high concrete grades decreases the compressive and early strength of these grades.
3. Fly ash used to lower the cost and improve the performance of PCC.
4. The maximum 7 day compressive strength for the concrete containing class c fly ash was obtained at approximately 35% replacement of cement by fly ash, while class F fly ash achieved maximum compressive strength at approximately 25% cement replacement.

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