A Brief Review on GGBFS and Thermocol Concrete

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ABSTRACT
In the present day context raw material for construction has been decreased. Therefore construction industry has introduced novel methods by making use of the available waste material for partial replacement of cement. It is user friendly as well as cost effective resource. Hence the main objective of the project is using the available waste material in concrete industry.

Some of the industrial by-products like GGBS, fly ash, copper slag, steel slag, silica fume have been successfully replaced for cement and concrete in the construction industry. It reduces the consumption of natural resources. Steel slag is a by-product (waste material) obtained during the matte smelting and refining of copper. Its physical properties are similar to the fine aggregate, so it can be used as a replacement for fine aggregate in concrete. Likewise replacement of coarse aggregate is done by some materials, which makes the concrete light weight.

Keywords--- GGBS, EPS, M30

I. INTRODUCTION
Use of light weight concrete has been a feature in the construction industry for centuries. It has an expanding agent which increases the volume of the mixture and simultaneously reduces the dead weight of the mixture. The main features of the lightweight concrete are its low density and low thermal conductivity. It is lighter than the conventional concrete with a dry density of 300kg/m up to 1800 kg/m. the reduced weight has many advantages, one of them is reduced demand of energy during construction.

II. LITERATURE REVIEW
Abhijit Mandlik, Tarun Sarthak Sood, etal., studied about the use of lightweight concrete using EPS. It can be used in various construction fields like repairing wooden floors of old buildings, carrying walls of low thermal conduction, bridge decks, floating quay, etc. Hence it’s been observed that the cost of EPS concrete is less when compared to normal concrete. Increase in the EPS beads content in concrete mixes reduces the tensile strength of the concrete.

Lakshmi kumar Minapu etal. , studied lightweight concrete as a great replacement for construction purpose. Light weight concrete plays a vital role in reducing the density and increasing the thermal insulin. This paper also focuses on the mechanical properties of a structural grade concrete M30, using lightweight aggregate as a partial replacement to coarse aggregate and mineral admixtures like fly ash and silica fume.

Hemant k. Sarje and Amol S. Autade has examined about the process of developing Lightweight concrete. this paper focuses on the compressive test, water absorption and flexural tests. The main fortes of lightweight concrete is its low density and low thermal conductivity which simultaneously reduces the dead load and increases the building rate, by mixing fly ash and aerating agents like kemelite- P,.R. Protein based foaming agent.

Ganesh Babu and SaradhiBabu concluded that Lightweight concrete can be produced by replacing the normal aggregate with lightweight aggregate, either partially or fully, depending upon the requirements of density and strength. The present study covers the use of expanded polystyrene (EPS) beads as lightweight aggregate both in concretes and mortars containing silica fume as a supplementary cementitious material. The main objective of this project is to study the strength and the durability performance of EPS concretes. These mixes were designed by using the efficiency of silica fume at different ratios. The resulting concretes were seen to have densities varying from 1500 to 2000 kg/m³, with the corresponding strengths varying from 10 to 21 MPa. The rate of strength gain for these concretes shows that an increase in the percentage of silica fume increases the7-
day strength. This was observed to be about 75%, 85%, and 95% of the corresponding 28-day strength at the silica fume replacement level of 3%, 5%, and 9%, respectively. The results of absorption, at 30 min and the final absorption, shows that the EPS mixes made with sand has lower levels of absorption compared to the mixes containing normal aggregates. Further, the absorption values were seen to be decreasing with increasing cementitious content. The performance of these concretes, in terms of their chloride permeability and corrosion resistance, even at the minimal silica fume content level was observed to be very good.

W.C. Tang a et al., studied the creep behaviour of Polystyrene Aggregate Concrete (PAC). The creep recovery of PAC were determined experimentally and is compared with normal weight concrete. The parameters includes polystyrene aggregate (PA) content, curing and storage conditions. The ultimate creep strains for the polystyrene aggregate concrete were estimated using hyperbolic expression and are compared with other common prediction models for normal weight concrete. The experiment shows that creep of polystyrene aggregate concrete increased with the increase of PA content in the mix. The ratios of creep recovery to creep strains decreased slightly with an increase in PA content. The curing and storage conditions showed remarkable influences on the creep of PAC, but not for its creep recovery. Besides, the creep prediction results were compared against the prediction models given by ACI and CEB-FIP.

DanetiSaradhiBabua et al. investigated the effect of polystyrene aggregate size on strength and moisture migration characteristics of light weight concrete. The study covers the use of expanded polystyrene (EPS) and un-expanded polystyrene (UEPS) beads as light weight aggregate in concretes that contain fly ash as a supplementary cementitious material. Lightweight concrete with wide range of concrete densities (1000–1900 kg/m3) were studied mainly for compressive strength, split tensile strength, moisture migration and absorption. The results indicate that for aggregate size and concrete density, concrete with EPS aggregate exhibited 70% higher compressive strength than EPS aggregate. EPS aggregate concrete with small EPS aggregates showed higher compressive strength and the increase in compressive strength was pronounced in low density concrete when compared with high density concrete. The UEPS aggregate concrete exhibited brittle failure similar to normal weight concrete (NWC), whereas, gradual failure was observed in EPS concrete. Moreover, the moisture migration and absorption results indicate that the EPS concrete containing bigger size and higher volumes of EPS aggregate show higher moisture migration and absorption.

SaradhiBabua et al., concluded that Lightweight concretes can be produced by replacing the normal aggregates in concrete or mortar either partially or fully, depending upon the requirements of density and strength levels. The present study covers the use of expanded polystyrene (EPS) beads as lightweight Aggregate, both in concrete and mortar. The main aim of this programme is to study the these mechanical properties of EPS concretes containing fly ash and compare the results with concretes containing OPC alone as the binder. The effects of EPS aggregate on the green and hardened state characteristics of concretes containing fly ash were evaluated. The compressive strength of the EPS concretes containing fly ash show a continuous gain even up to 90 days, unlike that reported for OPC in literature. It was also found that the failure of these concretes both in compression and split tension was gradual as was observed earlier for the concretes containing plastic shredded aggregates. The stress–strain relations and the corresponding elastic modulus were also investigated

III. CONCLUSION

From the past detailed studies, it can be inferred that

The researches made by different experts, show that, partial replacement of coarse aggregate will decrease the density of concrete and increases the strength slightly. Durability of the concrete also has an increased value. Therefore it is giving an area to make a parametric study with the different propositions of replacement of coarse aggregate. In most of the cases, polystyrene is used as the coarse aggregate replacer. Our objective for research is fixed with this literature review.

REFERENCE

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