

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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10CV85 PROJECT REPORT

ON

“ASSESSMENT OF STRENGTH CHARACTERISTICS OF ECOCONCRETE WITH BINARY AND TERNARY CEMENTITIOUS MATERIAL AND POND ASH AS FINE AGGREGATE”

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in

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SYNOPSIS

Title - “Assessment of Strength Characteristics Of Eco-concrete With Binary and Ternary Cementitious Material and Pond Ash as Fine Aggregate”

Fly Ash is a thermal power plant waste material is known to behave as a pozzolanic material and now accepted in concrete design as a component of cementitious material. However, other industrial waste products like GGBS, Rice Husk Ash etc also need to be used as cementitious materials.

Pond ash – a waste of Thermal Power Stations, if addresses the crucial issues concerning the shortage (depleting) of naturally available fine aggregate (river sand), will prove to be a stimulus to industry to sustain the growth of the industry, reduce the demand for large area of disposal of thermal power plant waste, most importantly, reduce its environmental impact with proper utilization of huge quantity of waste in construction industry.

Pond Ash is a material, that can be adopted as a suitable material as Fine aggregate in concrete, replacing Natural Sand partially or fully. The usage of pond ash as constituent in concrete addresses the issues related to its disposal, environmental and ecological problems, is a social responsibility of researchers, thus contributing to 3Rs - Reduce Reuse and Recycle, there by promoting sustainable construction. It is commonly thought that as inert filler, fine aggregate has very little effect on the finished concrete properties. However, fine aggregate (natural sand or alternative material) and its characteristics play a substantial role in controlling the workability, strength, and durability of the concrete constructions.

The main objective of the project is to produce eco-friendly sustainable concrete called ‘Eco-Concrete’ using alternative materials like fly ash, GGBS as binary and ternary cementitious material replacing cement partially and pond ash as fine aggregate replacing sand fully by weight.

Alternative materials such as industrial byproduct Coal Ash (Fly Ash and Pond Ash) , Ground Granulated Blast furnace Slag - GGBS in concrete is an important eco efficiency drive. It is the social responsibility of researchers to encourage the “beneficial use of industrial by- products in order to preserve resources, conserve energy and reduce or eliminate the need for disposal of industrial waste in landfills.

Huge volume of waste product generated in industries if used efficiently, effectively in various constructions, encourage the large scale utilization of industrial waste, facilitating human habitation, replacing fast depleting natural resource, so as to contribute to sustainable construction and also helps in conserving the precious top soil required for growing food contributing to environmental and ecological benefits.

The present study consists of evaluation of fresh properties and mechanical strength of Eco-Concrete – Concrete made with industrial by-products, replacing cement and fine aggregates.

Cement content of design mix of M20 and M30 grade normal concrete is replaced with 20% fly ash as binary cementitious material and 10% GGBS – Ground Granulated Blast Furnace Slag as ternary cementitious material. Natural river sand of the mixes is replaced with Manufactured Sand (M-Sand) and also with Pond ash. The properties of eco-concrete are compared with that of normal concrete to assess the behaviour in fresh and hardened state.

Use of M-Sand as fine aggregate in concrete replacing natural river sand is proved beneficial in terms of properties of concrete and cost criteria. Whereas, use of pond ash in concrete replacing sand fully showed a strength reduction of nearly 30% (Bharathi Ganesh 2013). The main objective of the present study is to evaluate the effect of using fly ash and GGBS in pond ash concrete to evaluate the improvement in strength of pond ash concrete with finer binary and ternary cementitious materials, replacing cement partially

From the experimental study on M sand concrete and Pond ash concrete, it may be concluded that the behaviour of eco-concrete, that is concretes with 70% cement, 20% fly ash, 10% GGBS and either M-Sand or Pond Ash as fine aggregates show better results in terms of its compressive strength, flexural strength and split tensile strength, encouraging the use of industrial by-product in concrete as ingredients to reduce the usage of cement and also to replace natural river sand as fine aggregates.