

Partial Replacement of GGBS in Concrete for Prevention of Natural Resources

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Abstract : Concrete is the most common and widely used building material. Concrete is basically made of aggregates, both fine and coarse, glued by a cement paste which is made of cement and water. Each one of these constituents of concrete has a negative environmental impact and gives rise to different sustainability issues. The current concrete construction practice is unsustainable because, not only it consumes enormous quantities of stones, sand, and drinking water, but also one billion tons a year of cement, which is not an environment friendly material. Preventing the reduction of natural resources and enhancing the usage of waste materials has become a challenge to the scientist and engineers. A number of studies have been conducted concerning the protection of natural resources, prevention of environmental pollution and contribution to the economy by using this waste material. This paper outlines the influence of Ground Granulated Blast furnace Slag (GGBS) as partial replacement of fine aggregate on mechanical properties of concrete. The strength of concrete is determined having OPC binder, replaced the fine aggregate with 15%, 30%, 45% respectively. For this purpose, characteristic concrete mix of M25 with partial replacement of cement with GGBS is used and the strength of concrete cubes and cylinder have determined. The strength of concrete specimens has been compared with the reference specimen. Also X-ray diffraction (XRD) and scanning electron microscope (SEM) tests have been performed to examine the hydration products and the microstructure of the tested specimens. A correlation has been established between the developmental strength concrete with and without GGBS through analysis of hydration products and the microstructure.

Keywords : GGBS, sand, concrete, workability

Conference Title : ICCESE 2015 : International Conference on Civil, Environmental and Structural Engineering

Conference Location : Kuala Lumpur, Malaysia

Conference Dates : February 12-13, 2015