

Study on the Strength and Durability Properties of Ternary Blended Concrete

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Abstract : Concrete is the most common and versatile construction material used in any type of civil engineering structure. The durability and strength characteristics of concrete make it more desirable among any other construction materials. The manufacture and use of concrete produces wide range of environmental and social consequences. The major component in concrete, cement accounts for roughly 5 % of global CO₂ emissions. In order to improve the environmental friendliness of concrete, suitable substitutes are added to concrete. The present study deals with GGBS and silica fume as supplementary cementitious materials. The strength and durability studies were conducted in this ternary blended concrete. Several mixes were adopted with varying percentages of Silica Fume i.e., 5%, 10% and 15%. Binary mix with 50% GGBS was also prepared. GGBS content has been kept constant for the rest of mixes. There is an improvement in compressive strength with addition of Silica Fume. Maximum workability, split tensile strength, modulus of elasticity, flexural strength and impact resistance are obtained for GGBS binary blend. For durability studies, maximum sulphate resistance, carbonation resistance and resistance to chloride ion penetration are obtained for ternary blended concrete. Partial replacement of GGBS and Silica Fume reduces the environmental effects, produces economical and eco-friendly concrete. The study showed that for strength characteristics, binary blended concrete showed better performance while for durability study ternary blend performed better.

Keywords : concrete, GGBS, silica fume, ternary blend

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