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Effect of Silica fume and Granite on Physical and Mechanical Properties of Concrete

Concrete, a major part of construction is extensively used nowadays in the field of engineering. Due to its usage in simple construction projects to skyscrapers, it is classified into a wide variety of types. The most advanced type known as high performance concrete which is mostly adopted for high rise buildings or areas where strength is the utmost priority.

Such type of concrete can be produced by adding different cementatious materials such as silica fume, fly ash, and limestone powder in cement which significantly increases the strength and durability of concrete as compared to normal concrete.

Silica fume being a reactive pozzolon, increases the overall properties of concrete due to its binding and micro filling properties. On the other hand, granite can also be used as a supplementary material to increase the crushing strength of concrete as it is a plutonic igneous rock. Granite offers high durability, strength, excellent resilience to acid attacks than other types of rocks.

In this research study, the effect of silica fume and granite on physical and mechanical properties were investigated. Various specimens were produced in several mix proportions in which cement was replaced by silica fume in 5,7,10,12% by weight whereas coarse aggregate was replaced by granite in 5,10,15,20 % by weight. Elastic modulus,volumetric water absorption and Mercury Intrusion Posimetry of silica fume concrete were also determined. Polycarboxylate HRWR Super plasticizer was used to reduce the water binder ratio.

The slump cone test was performed on concrete to determine the workablity and loss of slump. The optimum quantities of both silica fume and granite were found out that results in the highest strength by performing a wide variety of tests such as compressive, split tensile and flextural strength tests at 28 days. Test results indicate that by replacing cement to silica fume at 12% and coarse aggregate to granite at 20% by weight significantly increases the compressive, tensile and flexural strength of concrete.

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