ABSTRACT

Nanomaterial concrete is new generation concrete formed of materials of the grain size of Nano scale. The composition of nanomaterial concrete consists of cement, Nano material grain size of 10 nm - 140 nm, fine sand of the grain size of IS 4.75mm sieve passing , coarse aggregate of a maximum grain size of 20 mm and potable water. Nano materials have properties or functions different from similar materials of large size. Nano materials have a larger value of the ratio between surface area and volume than other similar particles in larger size, making the nanomaterial more reactive. Project is aimed to investigate the influence of Nano materials (nano silica, nano aluminium oxide and carbon nano tubes) as a partial substitution of cement in concrete. The presence of Nano silica in concrete is intended to accommodate the byproduct of the cement hydration production in the form of free hydroxide calcium. Nano silica will react with C_3S and C_2S in the cement and produce CSH-2 that will form a strong and solid bond of gel. The results showed that the addition of Nano silica as cement partial substitute material could improve the mechanical behavior of the concrete. Use of nano SiO_2 nanoparticles as stable aqueous sols from hydrothermal solutions to enhance the mechanical properties of concrete. SiO_2 nanoparticles 10–140 nm in size with a specific surface of 60–500 m^2/g were brought in the cement–sand–water system ranging from 1% to 3% wt. (with respect to the amount of cement). The nanoparticles were homogeneously distributed. The functions of the weight fraction of nanoparticles; the compression durability of solid samples was found to significantly depend on this parameter.

Concretes containing various supplementary cementitious materials (SCMs) such as silica fume, fly ash, and slag have improved properties. Nanomaterials (a nanometer, nm, is 10^{-9} m), new SCMs with possible applications in concrete, have the smallest particle size that is less than 100 nm. Nanomaterials are very reactive because of the particles' small size and large surface area and have great potential in improving concrete properties such as compressive strength and permeability. The study has evaluated the use of a variety of nanomaterials in concrete compared with conventional concrete and concrete containing common SCMs.

The potential benefits of using nanomaterials over other SCMs are their high reactivity; the need for smaller amounts, resulting in less cement replacement; and cost-effectiveness.

Specimens will be tested for compressive and tensile strength. The microstructure of selected concretes with improved compressive strength will be analyzed using a universal testing machine. The obtained microstructure of the nanosilica concrete is denser and more uniform than that of the conventional concrete microstructure. In addition, the nanosilica has the largest improvement in both compressive strength and permeability among other nanomaterials.