ABSTRACT

Water seepage is a major problem in construction industries particularly when the buildings are constructed in the damped environment. The basic solution to reduce number of voids and capillaries in concrete is to control water–cement ratio along with proper mechanical compaction. During hydration, the capillaries can become discontinuous or partly blocked due to the formation of cement gel.

Waterproofing admixtures are the materials added in small quantities during the mixing process of concrete. This is related to the mass of cement to modify the physical and mechanical properties in the fresh and hardened state. The waterproofing admixtures react with the calcium of the fresh cement to form an insoluble material which adsorbs onto the surfaces of the capillaries. They are frequently used to help to achieve the properties such as strength enhancement, density, resistance to water penetration, corrosion protection, finish enhancement, etc.

This thesis deals with the changes due to the addition of waterproofing admixtures on the workability, strength and durability of concrete. The workability studies have been carried out by using various w/c ratios such as 0.55, 0.60 and 0.70. Five different chemical admixtures were chosen and they were added in three different dosages from 0.12 to 0.59% by weight of cement) mixed thoroughly with the M20 designed concrete mix,
cured for 7 days and 28 days and then tested. The specimens were tested for various strength properties such as compressive strength, tensile strength, flexural strength and modulus of elasticity with and without admixtures and the results were compared. The durability of concrete was studied by conducting water permeability test by steady state flow method in 7 and 28 days cured concrete specimens. The resistance to chemical attack of concrete using waterproofing admixtures was studied by conducting acid and chloride test by immersing the concrete specimens in chemicals for 90 days and they have been tested for compressive strength for finding the strength reduction after immersion. The effect of admixtures on the corrosion behavior of reinforced concrete was studied by conducting accelerated corrosion test on 28 days cured concrete specimens embedded with steel bar. Since the pores present in the concrete were blocked due to the addition of admixtures, it reduced the corrosion. The influence of waterproofing admixtures on the chloride ion penetration characteristics of concrete was studied by conducting rapid chloride penetration test and the results were compared with the results of conventional concrete. The contribution of waterproofing admixtures on the shrinkage characteristics of concrete with various admixtures and various curing periods such as 28 days, 60 days and 90 days were also studied by conducting drying shrinkage test. Addition of waterproofing admixtures reduced the mid span and 1/3rd span deflections in the flexural strength test and thus the flexural stiffness was found to increase.