CHAPTER 1

INTRODUCTION

1.1 GENERAL

Concrete is the most widely used artificial construction material in the world and it is second to water as the most utilized substance on the planet (Gambhir 2009). A tremendous infrastructure development has taken place in the country (throughout the world) and making of the concrete for higher strengths to cater to the requirements are significant. The concretes are prepared by blending with various admixtures to cater to the advanced needs and requirements. The replacement of admixtures with the cement in the concrete and preparation of the blended concrete have paved the way to make the best use of the available admixtures, mix proportioning and other factors to produce the concrete satisfying the higher performance requirements. The strength, durability and other characteristics of the concrete depend upon the properties of its ingredients, replacement of admixtures with the cement, proportions of mix, method of compaction and other controls during pouring, vibrating and curing thereafter.

1.2 ADMIXTURES

Admixtures are the chemical compounds in concrete other than cement, water, fine aggregate and coarse aggregate and mineral additives that are added to the concrete immediately before or during mixing to modify the
properties of the concrete. The addition of the admixture will improve the properties of the concrete and also it should be taken care that it should not adversely affect the performance of the concrete. The suitable admixture should be employed only after an appropriate evaluation of its effects on the performance of the concrete is done. The admixtures had formulated suitable chemical composition and special chemical action and are used to modify certain properties of the concrete. They are mostly employed to minimize the cost of the concrete construction and to modify the performance of hardened concrete (Gambhir 2009).

The properties commonly modified are the workability, rate of hydration or setting times, dispersion and air entrainment. The admixture is added in a relatively small quantity. Most of the admixtures are available in liquid form and are added to the concrete at the mixing plant or at the jobsite. Few admixtures such as expansive agents, pigments, accelerators, retarder’s pigments, pumping aids etc are used only extremely small amounts and are usually batched by hand from premeasured containers. The efficiency of the admixture depends on various factors which include quality of cement, quantity of cement, water content, slump, mixing time etc.

1.2.1 Objectives of the Addition of Admixtures

1. To improve the workability of the concrete.
2. To improve the pumpability of the concrete.
3. To improve the durability of the concrete.
4. To improve the strength of the concrete.
5. To reduce the capillary flow of the concrete.
6. To accelerate the initial setting time of the concrete and some times to retard the initial setting time of the concrete.

7. To reduce the segregation.

8. To control the alkali aggregate expansion or alkali silica reactivity.

9. To inhibit the corrosion of reinforcement placed in the concrete.

10. To increase the resistance to chemical attack.

11. To reduce the weight of the concrete.

12. To produce coloured concrete.

13. To produce concrete of fungicidal, insecticidal and germicidal properties.

14. To produce cellular concrete.

15. To produce non skid wearing surfaces.

16. To increase the bond strength of the concrete.

17. To increase the bond between new and old concrete surfaces.

1.2.2 Types of Admixtures

The admixtures are categorized based on the function it performs and characteristic effects produced by them. Some of the important types of admixtures are as follows.

1. Water reducing admixtures

2. Air entraining admixtures

3. Retarding admixtures
4. Accelerating admixtures
5. Colouring admixtures
6. Concrete surface hardening admixtures
7. Insecticidal admixtures
8. Fungicidal admixtures
9. Germicidal admixtures
10. Bonding admixtures
11. Damp proofing admixtures
12. Permeability reducing admixtures
13. Shrinkage reducing admixtures
14. Grouting admixtures
15. Gas forming admixtures
16. Air detraining admixtures
17. Corrosion inhibiting admixtures

1.2.3 Multi Component Blended Concrete

Four different admixtures are added to modify and improve the properties of the concrete to counteract few adverse environments. The admixtures added in this research work are fly ash, silica fume, calcium nitrate and rice husk ash.

1.3 OUTLINE OF THESIS

To obtain necessary data, several cubical concrete specimens, cylindrical concrete specimens and reinforced concrete wharf specimens are prepared and laboratory tests have been performed to determine the various
important properties of the concrete. The first chapter gives the details about
the introduction, scope of the project and methodology of the research work.
The second chapter presents the various literature reviews. The third chapter
narrates the details about experimental programs followed in the research
work. The fourth chapter gives details about results and discussions of the
strength properties of the concrete in detail. The fifth chapter gives details
about results and discussions of the durability properties of the concrete in
detail. The sixth chapter gives details about conclusion of the research work
and scope for the further research.