

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter details the procedures followed in the preparation of the concrete specimens. The materials used and corresponding specification are outlined. The various test methods and test procedures are also detailed and explained. The preparation of steel fiber reinforced acrylic emulsion polymer modified concrete (SFRPMC) was carried out carefully to achieve the required quality of final matrix. In this research study, three different percentages volume of steel fibers (1.0%, 1.5% and 2.0%), silica fume (5%, 6% and 8%), acrylic emulsion polymers (1.0%, 2.5% and 4.0%) and water cement ratio (0.42, 0.50 and 0.60) were used. The ordinary Portland cement corresponding to ASTM Type I cement was used in all mixture proportions. The acrylic polymer resin system that was used in this research was emulsion polymer that can be mixed with water and cement as matrix.

The mixing and casting of the specimens were done according to BS5328: 1988. The specimens also were cured according to BS1881: Part 3 (1983). Design of a trial mix was very important to ensure the design characteristic strength achieved. The purpose of this trial mix was to determine the best mix proportion of acrylic emulsion polymer as partial cement replacement to be used and also steel fiber as reinforcement non-load-bearing element. Curing condition was very important in gaining the designed strength of concrete. After demoulding specimens were cured in water in curing tank before testing for 3 days, 7 days, and 28 days. Figure 3.1 shows the outlines for overall research design methodology.

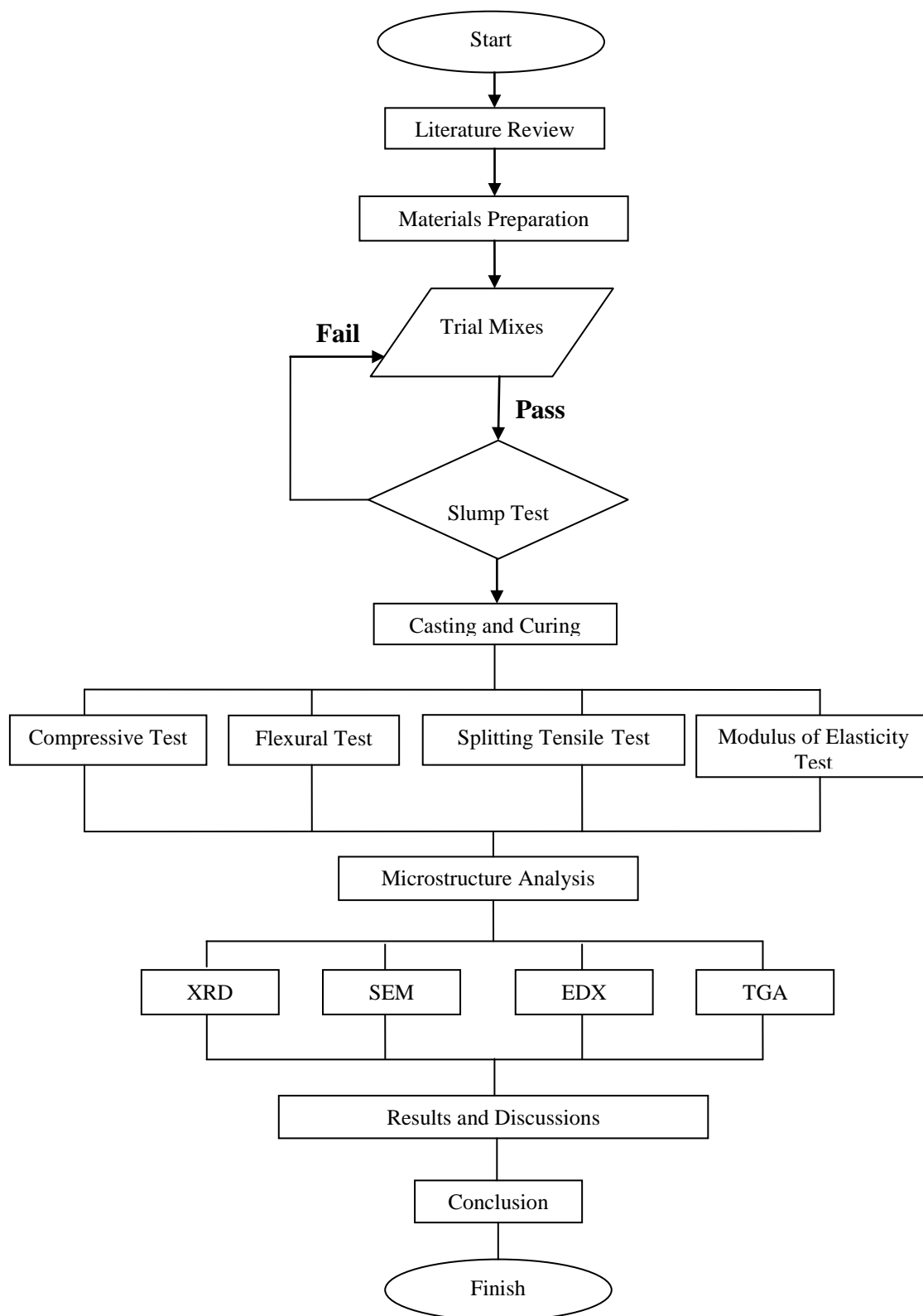


Figure 3.1: Research methodology flow chart

3.2 SELECTION OF MATERIALS

Materials listed below were used in the preparation of the specimen in this study.

3.2.1 Cement

The cement used in this study was ordinary Portland cement Type I (ASTM C150) which is general-purpose cement suitable for all uses. The cement was kept in an airtight container and stored in the humidity controlled room to prevent cement from being exposed to moisture.

3.2.2 Acrylic Emulsion Polymer

Acrylic Emulsion Polymer (Figure 3.2), a product from Tufbond Technologies is synthetic acrylic latex intended for manufacturer of cement products. This material provides excellent water resistance. It has a fine particle size, good water resistance, excellent adhesion to concrete and excellent UV resistance. It is milky white and has 43% – 46% non-volatile solids, has 100 cps maximum of viscosity and 18° C of T_g (*glass transition temperature*).



Figure 3.2: Acrylic emulsion polymer

Source: Tufbond Technologies