

Preface to the Second Edition

The aim of this thorough and comprehensive update of 2002 edition by the author is twofold: addresses concrete technology as well as concrete construction highlighting the principal causes of concrete deterioration along with protective measures in the light of Canadian, American, and British standards. Apart from minor changes in the text, many new topics are included explaining various topics in depth with examples and pictures, so that the reader looking for any information about concrete construction should find at one place.

The book is designed to provide the reader with advanced, in-depth knowledge of both the theory and practical application of concrete technology to prepare the civil engineering students for a variety of senior roles. The book is equally useful for all those civil engineering professionals who are involved in construction process. Providing references from the highly adopted standards within the construction industry, the book allows the reader to embrace knowledge enabling him to work on site with advanced understanding of concrete construction. The book would also serve as a basic tool of information and knowledge for immigrant professionals.

In practice, concrete construction is based on various codes and standards. The book will enable the reader to understand different nomenclature used for the same materials in different parts of the world. For example, in the United States, ASTM-C150 refers various types of cement as Type-I, Type-II, Type-III, Type-IV, and Type-V, whereas in Canada CSA refers differently same type of cements as GU, HE, MS, HS, MH, and LH, and in the United Kingdom, the categories of cements are divided differently in five types based on their composition as per European standard BS EN 197-1-2000, which has replaced most of the British standards. Similarly, types, grades, and sizes of steel reinforcement are also referred differently by ASTM, CAN/CSA, and BS-4449. Additionally, grading requirements for concrete aggregates are also different in the United States, the United Kingdom, and Canada. Hence, this book will provide the reader practical information with respect to concrete construction in the light of various standard codes being used in many parts of the world.

The book covers the basic information about normal concrete in its first part, about its grades, and about 14 different kinds of modified concretes including poly-

mer concretes, fiber-reinforced concrete, sulfur concrete, and high-performance and ultrahigh-performance concretes. It provides complete information on constituent materials of concrete such as Portland cement, its chemical composition, types of cement used in various countries, blended cements, and special cements including physical properties of Portland cement, such as fineness, setting time, soundness, hydration, and strength with references to ACI, CSA, and BS standards. About 13 admixtures and additives are explained in the book including requirements for the use of curing and mixing water and coarse and fine aggregates including recycled concrete aggregates. The book further highlights the physical properties of concrete: workability and its methods of measurement, segregation, bleeding, plastic shrinkage, and air entrainment with various methods of measurement. The book also describes the structural properties of the concrete: strength, durability, permeability and porosity, shrinkage, modulus of elasticity, Poisson's ratio, creep, and thermal properties of concrete. The information on concrete British and ACI mix design methods with examples is also provided.

On the other hand, the second part of the book highlights the principal causes of concrete deterioration along with protective measures, resulting from incorrect selection of constituent materials and poor construction methods such as the use of excess water content, segregation, poor compaction, and inadequate cover to reinforcement, incorrect placement of steel, inadequate formwork, poor curing, inadequate mixing, and incorrect placement of construction joints. The book further addresses external factors affecting concrete production such as freezing and thawing, wetting and drying, leaching, abrasion, overloading, settlement, fire resistance, and the type of joints including causes of joint failures. Additionally, the book provides information on chemical attacks such as chloride attack, sulfate attack, carbonation, alkali-aggregate reaction, and acid attack. The book further explains hot and cold weather effects, corrosion of embedded metals in concrete, and various errors in designing and detailing. A chapter discussing the methods for achieving quality control and ensuring quality assurance in concrete construction is also added.

Many new standards have been introduced in this second edition with updating of some old standards. However, still some old standards and references are retained because as per A. M. Neville (*Properties of Concrete*—Fifth edition), they contribute to knowledge of what is desirable in the understanding of a relevant property. Secondly, the old references contain the development of our knowledge. Additionally, the British standards are being replaced by European standards denoted by BS EN, and this process will be completed up to 2020. Hence, wherever possible, revised BS standards to BS EN are used; otherwise the old BS standards are retained. However, the author has provided information about old BS standard used in this book and its related revised standard at the end of the book under Annexure. Given continuing evolution of standards, for specific use, the reader can refer to the new or revised standards specified in "Bibliography" section provided at the end of each chapter and Annexure, if required.