PREFACE

Today, the development of any country is reflected with its industrialization growth. Various processes such as industrial, mining, municipal, agricultural and many more are involved in the generation of large extents of their waste and by-products. The enhancement and advancement in solid waste management is a general trend of today's development of alternative ways to exploit these wastes into construction materials in addition to traditional materials like tiles, bricks, blocks, concrete, aggregates, ceramics, cement, soil, and paint. Attempts are also being made to utilize these wastes as filler in embankment design, as sub-base and base layers in road construction.

Jarosite is a solid waste remain during the hydrometallurgical operations involved in the extraction of zinc from the lead-zinc smelter. It contains heavy metals and toxic elements more than the permissible limits that are preferred for safe disposal. Thus, its disposal remains a universal problem concerning environmental issues. In the past few decades, numerous researchers have explored the possibility to reduce, reuse and recycle (3-R) of jarosite waste to some extent. To explore the utilization potential of stabilized jarosite waste, various studies were carried out and are laboratory discussed in subsequent chapters. The current study promotes the utilization of hazardous jarosite waste blended with steel industry waste, i.e., Ground granulated blast furnace slag (GGBS) (used as a pozzolanic material) and hydrated lime (used as an alkali activator) to use it as a construction material in various applications of civil engineering.

The thesis entitled "**Utilization Potential of Hazardous Jarosite Waste as a Construction Material in Civil Engineering**" comprises of five chapters.

Chapter 1 is introductory in nature, which contains a brief introduction of jarosite along with its production process and utilization potential of jarosite waste advocated by

numerous researchers in various applications. The literature review enumerate the substantial research and development (R&D) studies carried out all over the world for the safe storage, disposal, and utilization of jarosite. The Scope and Objectives of the present work are also mentioned in this chapter.

Chapter 2 describes the materials used in these study along with their physical and chemical characterization. This chapter also explains the preparation methodology of samples for various tests carried out in this research work.

Chapter 3 details the experimental studies conducted in the laboratory along with their results and discussions. The experimental studies include, Compaction test (Mini compaction mold), Strength (Unconfined compressive and Split tensile strength tests), Durability (Freezing-Thawing test), Mineralogy and Morphology (X-Ray Diffraction (XRD) and Scanning electron microscope (SEM) corresponding to Energy-dispersive X-ray spectroscopy (EDX) tests) and Leachate analysis (Toxicity Leachate Characteristics Procedure (TCLP)- Inductively coupled plasma (ICP)) have been carried out on jarosite waste stabilized with GGBS and lime.

Chapter 4 describes the utilization potential of stabilized jarosite in the application of civil engineering along with their economic viability as compared to conventional materials.

Chapter 5 reports the conclusions based on the experimental results and discussion and future scope of in this area.

At the end, the list of references and publications are included.