Preface

This special edition presents a multidisciplinary exploration of engineering materials, structural behaviour of industrial structures, energy systems, and sustainability-driven technologies. The collected articles reflect the increasing need for innovative solutions that address industrial efficiency, environmental responsibility, and the evolving demands of modern society. From systems that use renewable energy and drilling processes to advanced materials, green building materials, structural mechanics and sustainable food packaging, the topics in this edition demonstrate the broad and interconnected nature of contemporary engineering research.

Chapter 1: Solar Collectors focuses on one of the most important technologies in renewable energy systems. Solar collectors play a vital role in converting solar radiation into usable thermal energy for domestic, industrial, and commercial applications. This chapter examines different collector designs, thermal efficiency, material selection, heat transfer enhancement, and system integration strategies.

Chapter 2: Drilling addresses one of the most fundamental manufacturing and material removal processes in engineering practice. The chapter discusses conventional and advanced micro-drilling techniques, drilling in surgery, tool materials, process parameters, cooling, etc. Applications are explored, emphasising productivity, precision, and process optimisation.

Chapter 3: Engineering Materials provides a broad overview of the fundamental classes of materials used in engineering applications: steel, iron and refractory materials. The chapter examines their structures, properties, processing methods, and performance characteristics.

Chapter 4: Sustainable Building Materials highlights the growing importance of environmentally responsible construction practices. This chapter explores innovative materials such as recycled aggregates from various waste, low-carbon cement, etc. Discussions include durability, lifecycle assessment, resource efficiency, and the role of sustainable materials in achieving resilient and environmentally conscious infrastructure.

Chapter 5: Mechanics of Structures examines the principles governing the behaviour of structural systems under various loading conditions, including seismic loads. The chapter covers stress analysis, deformation, stability, vibration, and failure mechanisms in complex structures. Both analytical and computational approaches are considered, providing insight into how structural safety and performance can be optimised.

Chapter 6: Sustainable Food Packaging Materials focuses on the development of eco-friendly packaging systems designed to preserve food quality while minimising environmental impact. The chapter explores biodegradable and bio-based polymers. With increasing concerns over plastic waste and food preservation, sustainable packaging materials represent a critical area of innovation at the intersection of materials science, environmental engineering, and public health.

This edition will serve as a useful reference for students, researchers, and professionals across a wide range of engineering disciplines.