Preface

This new edition is updated by Professor Ross, and while it retains much of the basic and traditional work in Case & Chilver's *Strength of Materials and Structures*, it introduces modern numerical techniques, such as matrix and finite element methods.

Additionally, because of the difficulties experienced by many of today's students with basic traditional mathematics, the book includes an introductory chapter which covers in some detail the application of elementary mathematics to some problems involving simple statics.

The 1971 edition was begun by Mr. John Case and Lord Chilver but, because of the death of Mr. John Case, it was completed by Lord Chilver.

Whereas many of the chapters are retained in their 1971 version, much tuning has been applied to some chapters, plus the inclusion of other important topics, such as the plastic theory of rigid jointed frames, the torsion of non-circular sections, thick shells, flat plates and the stress analysis of composites.

The book covers most of the requirements for an engineering undergraduate course on strength of materials and structures.

The introductory chapter presents much of the mathematics required for solving simple problems in statics.

Chapter 1 provides a simple introduction to direct stresses and discusses some of the fundamental features under the title: Strength of materials and structures.

Chapter 2 is on pin-jointed frames and shows how to calculate the internal forces in some simple pin-jointed trusses. Chapter 3 introduces shearing stresses and Chapter 4 discusses the modes of failure of some structural joints.

Chapter 5 is on two-dimensional stress and strain systems and Chapter 6 is on thin walled circular cylindrical and spherical pressure vessels.

Chapter 7 deals with bending moments and shearing forces in beams, which are extended in Chapters 13 and 14 to include beam deflections. Chapter 8 is on geometrical properties.

Chapters 9 and 10 cover direct and shear stresses due to the bending of beams, which are extended in Chapter 13. Chapter 11 is on beam theory for beams made from two dissimilar materials. Chapter 15 introduces the plastic hinge theory and Chapter 16 introduces stresses due to torsion. Chapter 17 is on energy methods and, among other applications, introduces the plastic design of rigid-jointed plane frames.

Chapter 18 is on elastic buckling.

Chapter 19 is on flat plate theory and Chapter 20 is on the torsion of non-circular sections. Chapter 21 is on thick cylinders and spheres.

Chapter 22 introduces matrix algebra and Chapter 23 introduces the matrix displacement method.

Chapter 24 introduces the finite element method and in Chapter 25 this method is extended to cover the vibrations of complex structures.

<div align="right">CTFR, 1999</div>