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Preface

Machine Design is a combination of engineering and art. The engineering part is important for the functional working of a machine, so that all the machine elements when assembled in a machine, work properly e.g. as an automobile, sewing machine, a lathe etc. The art part may also include ergonomics, to cause minimum fatigue, if the machine has to be used for a long time. The art part is adding aesthetic for appealing to the customers, such as the design of the body of a car, the design of the body of a washing machine etc. which attract the customers, and the design of the body of a machine, which is used in a factory etc. *Machine Design* considers the concepts of design for each element separately, such as the design of a shaft, a pulley etc. Loads on a part/component are assessed, checked for its safety within the safe strength of the selected material. Deflection also should be checked, to ensure that it is within the safe limit. The subject should not be confused with strength of materials. The subject is broad and covers a wide range of topics, included in the syllabi of the universities and colleges. The subject is so wide that it is covered in two semesters, for mechanical engineering students of the universities. Hence the book is also divided in *two volumes*. The language used in this book is direct and simple, so that an average student can understand and easily. The sequence of the chapters is arranged in such a way that the concepts described in earlier chapters become useful for subsequent chapters.

Symbols used for mathematical derivations have been so assigned, that they are easy to remember. There is no list of symbols in the beginning of the book, they are defined wherever they have been used in the text.

Volume - I is for the first course on *Machine Design*, covering first semester topics offered by most colleges. The main objective of this volume is to provide rules for the design of general-purpose machine elements. This volume has four units.

Unit 1 of the book is on *fundamentals* and has four chapters. The first chapter introduces basic fundamentals and types of machine design. Chapter 2 is on the selection of engineering materials, which will be useful for every part to be designed. Although manufacturing a part