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Mechanics of Machines

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Preface

The present text has evolved and grown from an earlier book by one of the authors entitled *Theory of Machines through Worked Examples*. When it was decided that the time had come for conversion to SI units, the opportunity was taken to change the format from a collection of problems to a conventional student-textbook. In the event, this has enabled a more comprehensive and self-contained work to be produced and the title has been modified to reflect this change. The book has been completely rewritten under co-authorship and this has provided an opportunity to incorporate fresh ideas in teaching and presentation of the subject.

The scope of the book is intended to give adequate coverage to students working for H.N.C. and H.N.D. in engineering, and to first- and second-year students of a full-time honours degree course. For the latter it will form a solid base for more advanced study, in topics such as machine design, vibrations, or control, depending on the specialisation adopted by individual universities and polytechnics.

The book begins with a chapter on the fundamental principles of mechanics of machines and, although this is necessarily extensive, a conscious effort has been made to deal only with those aspects which are essential to the understanding of later work. Throughout the book the aim has been to illustrate the theory by means of engineering applications over a wide field. Numerical examples have been carefully selected to give the reader a realistic appreciation of actual system parameters and performance.

The chapters then follow a traditional sequence, dealing first with the kinematics of machines and with force and velocity relations in systems where inertia effects may be neglected. Subsequently attention is turned to the analysis of specific machine elements such as clutches, belt drives and gears. This is followed by consideration of inertia effects in machines, leading naturally to the problems of balancing rotating and reciprocating masses. Three chapters are devoted to vibrations, both free and forced, of single- and multi-degree-of-freedom systems. The book ends with a chapter on the principles and applications of control in mechanical engineering.