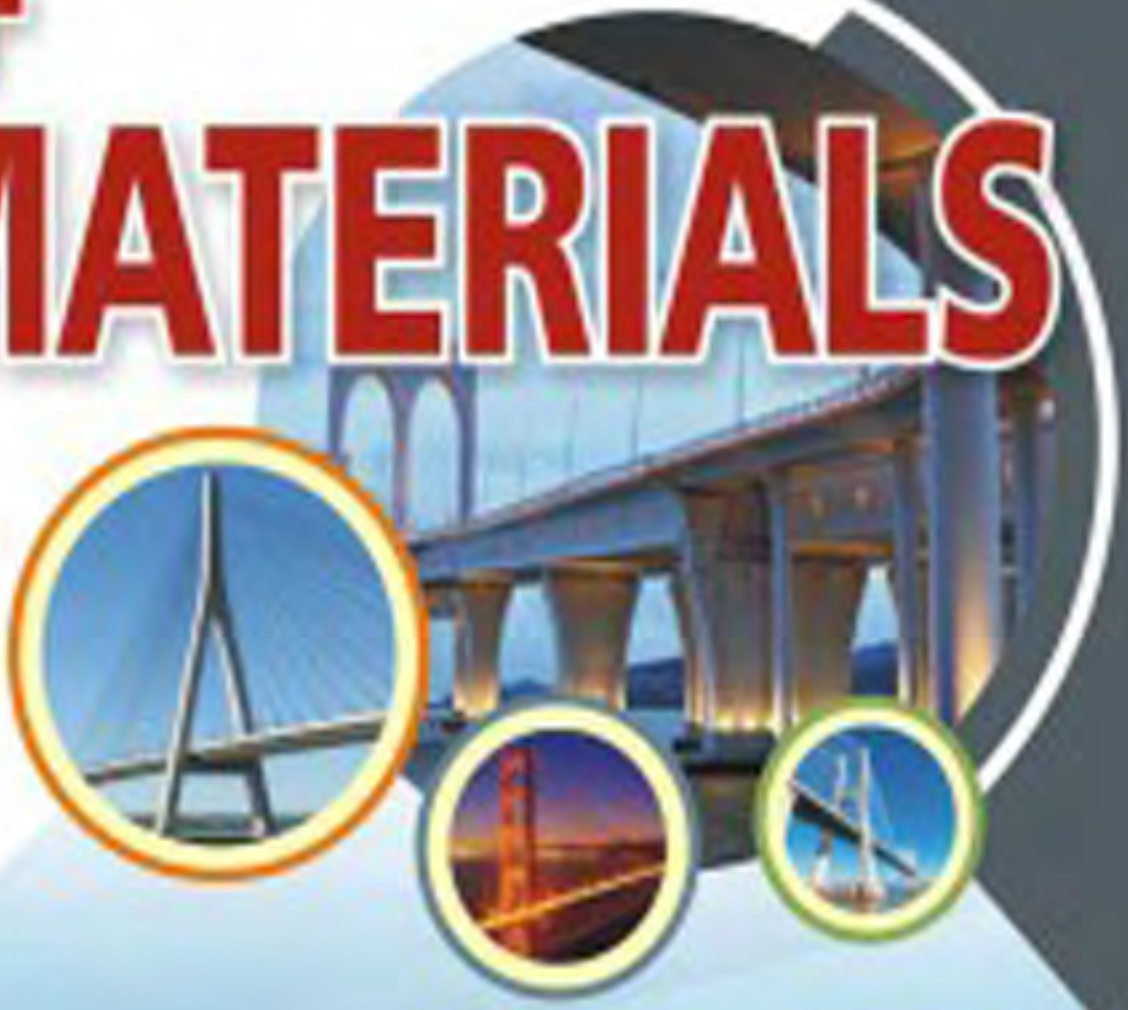
STRENGTH OF MATERIALS



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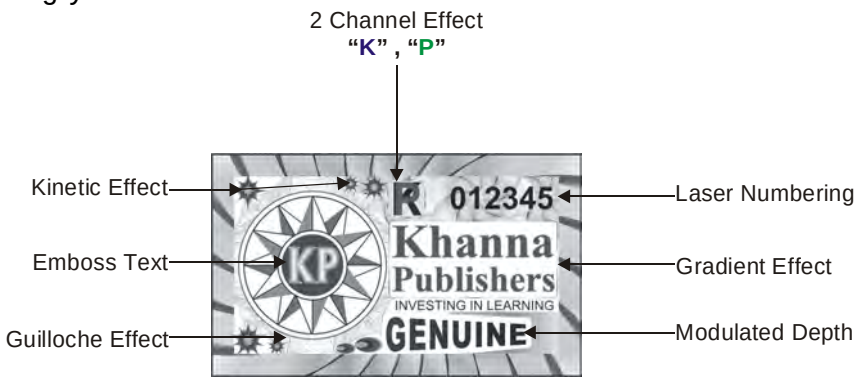

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Preface to the Tenth Edition

The ninth edition of the book was presented to the readers after careful revision of the entire text, with the valuable suggestions received from the readers. The book included unsolved problems in the Exercises at the end of chapters solved as advanced problems in each chapter alongwith solved problems of IAS, IES & GATE ; miscellaneous multi-choice questions duly solved with explanatory notes towards the end of the book.

The present edition includes many more solved numerical problems selected from the recent question papers of universities, IAS, IES & GATE examinations.

It is hoped that the book shall be further liked by the readers. The author expresses his sincere thanks to numerous readers in the country and abroad for their unsolicited letters of appreciation and fellow professors for their valuable suggestions and patronage of the book.

Suggestions for the inprovement of the text shall be thankfully acknowledged.

The continued support received from my wife Mrs. Manjit Kaur is highly appreciated. The utmost care taken by Mr. Vineet Khanna to produce the text is praise worthy.

Jalandhar, Punjab
15th June, 2010

Dr. SADHU SINGH

Preface to the First Edition

Strength of a material may be defined as the maximum resistance which a material can offer to the applied external loads. The stress induced in the material at any stage of loading is the level of this resistance offered by the material.

During the past many years, the subject "Strength of Materials" has developed tremendously and is being offered to engineering students at various levels of their undergraduate studies, in almost all the universities of the world. A number of books have been written by various authors on this subject, but none of these books thoroughly and completely deals with the full treatment of this subject. Further, various authors have used varied nomenclature, which sometimes create confusion in the mind of the reader. In this book the author has followed internationally recognised symbols throughout the book.

The book has been divided into eighteen chapters. First four chapters deal with the analysis of stresses and strains in simple and composite systems due to external loading and temperature effects. Relationships between the elastic constants and the method of determining the principal stresses and strains have been dealt with. Chapter five deals with the analysis of thin pressure vessels subjected to internal pressure. The method of determining the stresses in wire wound and shrink-fitted thin cylinders have also been included. In chapters six to eight the method of drawing the bending moment and shear force diagrams for beams, stresses in beams due to simple bending and the determination of slope and deflection of beams have been explained. Chapter nine concerns with the torsion of circular shafts and thin tubes. In chapter ten the method of determining the stresses due to combined and eccentric loading in simple structures, chimneys, masonary dams, retaining walls and riveted and welded joints have been outlined. In chapter eleven the method of finding the strain energy under simple loading conditions and the theories of elastic failure have been explained. Chapter tweleve deals with the elastic and plastic buckling of columns and beam columns. In chapter thirteen the analysis of close and open coiled helical springs, flat spiral springs, leaf and conical springs have been presented. Chapter fourteen to seventeen deal with the analysis for stresses in thick

pressure vessels ; centrifugal stresses in rotating rings, discs, cylinders and a spoked rim ; Winkler-Bach theory of bending of curved beams ; unsymmetrical bending and determination of shear centre. In the eighteenth chapter the mechanical testing methods for metal have been described in detail. These methods have been described from various Indian Standards as brought out by the Indian Standards Institution.

A number of solved and unsolved problems have been included in each chapter. Some of these problems have been taken from various central services examinations ; for the benefit of those appearing in these examinations. It is deemed that the book will be of immense use and helpful to the students, teachers and professional engineers.

Although utmost care has been taken in proof-reading and solving numerical examples, misprints or errors still left inadvertently, if brought to the notice of the author, will be highly acknowledged. The author is highly thankful to the Indian Standards Institution for allowing to include the various testing methods in chapter eighteenth. The author is also thankful to the publishers for their co-operation at all stages during the printing of this book.

Finally my sincere thanks are due to my wife, Mrs. Manjit for her patience and giving me encouragement to write this book.

Kurushetra
June, 1979

Dr. SADHU SINGH

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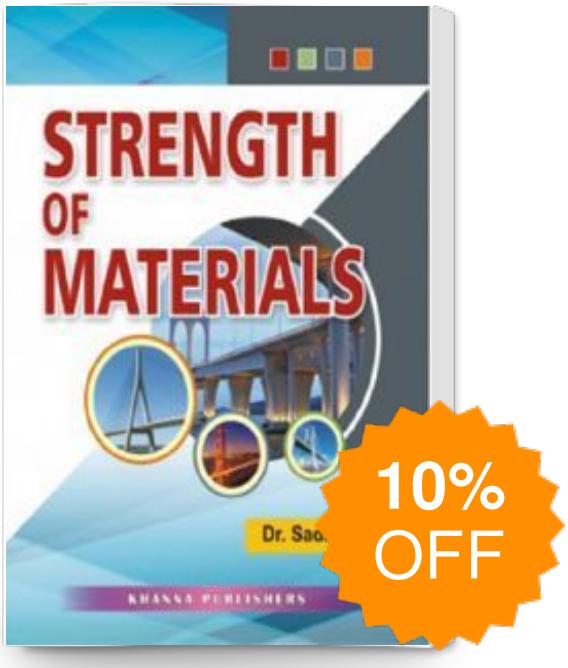

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