



EXPERIMENTS IN MECHANICS OF SOLIDS

By
B. M. Raval

Edition : 2nd Edition : 2023
ISBN : 9789385039614
Binding : Paperback
Pages : 172 + 12 = 184
Size (mm) : 235 × 10 × 170
Weight : 285 g



₹ 250.00 **BUY**

ABOUT THE BOOK

This book presents the clear understanding of the principles underlying Laboratory Experiments in Mechanics of Solids or Strength of Materials. Keeping in view the development of observation power, principles of mechanics of materials, standards and specifications, method of reporting the results and method of investigations as well as other basic experiments, the subject matter of the book is framed. Instruction to teachers, model assessment sheet, assignments and model slips for practical examination are given at the end of each chapter. Some of the models developed by the author are also discussed to inspire the readers to work in the same direction. IS: Index given at the end of each chapter is an additional information provided to study the experiment in detail.

With all the above salient features, this unique and invaluable book will be extremely useful to the Engineering students preparing for the Degree Examinations of Civil, Mechanical, Electrical, Electronics and Computer Engineering of all the Indian Universities. The book will be equally useful to the Polytechnic students and also to the candidates reading for the A.M.I.E. Examinations conducted by the Board of Technical Education Examinations. The Engineers connected with the "Laboratory Testing" would also find this book most useful.

CONTENT

- 1 : IMPORTANCE OF LABORATORY TESTS
 - 2 : LABORATORY MACHINES
 - 3 : TENSION TEST
 - 4 : COMPRESSION TEST
 - 5 : TORSION TEST
 - 6 : TRANSVERSE TEST
 - 7 : IMPACT TEST
 - 8 : HARDNESS TEST
 - 9 : FATIGUE TEST
 - 10 : BEND TEST
 - 11 : SOME EXPERIMENTS USING E.S.A. TECHNIQUE
 - 12 : MECHANICAL EXTENSOMETERS
 - 13 : PRESENTATION OF REPORT
 - 14 : PLANNING A STRENGTH OF MATERIALS LABORATORY
 - 15 : SOME WORKING MODELS IN EXPERIMENTAL MECHANICS OF SOLIDS
 - 16 : OBJECTIVE EXPERIMENTS
- APPENDICES
READING REFERENCES
SUBJECT INDEX

Catalogue Checklist

EXPERIMENTS IN MECHANICS OF SOLIDS
DETAILED CONTENTS

Chapter 1 IMPORTANCE OF LABORATORY TESTS

- 1-1 General
- 1-2 Importance of testing
- 1-3 Short explanation of mechanical properties of materials
- 1-4 Important factors
- 1-5 Types of tests
- 1-6 Test design
- 1-7 Specimen
- 1-8 Testing
- 1-9 Specification and standards
- 1-10 Testing machines
- 1-11 Classification of properties of engineering materials
- 1-12 Laboratory exercises
- 1-13 General laboratory testing
- 1-14 Purpose of different tests
- 1-15 Use of structural materials
- 1-16 Course of study

Chapter 2 LABORATORY MACHINES

- 2-1 Instruction
- 2-2 Single lever testing machines
- 2-3 Static testing machines
- 2-3-1 Universal testing machine
- 2-3-2 Torsion testing machine
- 2-4 Calibration of testing machines
- 2-5 Procedure for calibration of testing machine
- 2-6 Common instruments for dimension of a specimen measurement

Chapter 3 TENSION TEST

- 3-1 Tension test
- 3-2 Important terms in tension test
- 3-2-1 Gage length (L_0)
- 3-2-2 Extension or elongation (δL)
- 3-2-3 Stress (σ)
- 3-2-4 Strain (ϵ)
- 3-2-5 Modulus or elasticity (E)
- 3-2-6 Yield stress (f_y)
- 3-2-7 Permanent set
- 3-2-8 Tensile strength
- 3-2-9 Percentage elongation
- 3-2-10 Percentage reduction in area
- 3-3 Procedure for tension test
- 3-4 Reporting of results
- 3-5 Discussion
- 3-6 Observations
- 3-7 Calculation
- 3-8 True stress and true strain
- 3-9 For teachers
- 3-10 Model assessment sheet
- 3-11 Assignments to determine mechanical properties in tension test
- 3-12 Assignments for practice
- 3-13 Model assignment slips for practical examination

Chapter 4 COMPRESSION TEST

- 4-1 Compression test
- 4-2 Specimen
- 4-3 Test procedure
- 4-4 Reporting of results
- 4-5 Discussion
- 4-6 For teachers
- 4-7 Model assessment sheet
- 4-8 Assignments to determine mechanical properties in compression test
- 4-9 Assignment for practice
- 4-10 Model assignment slips for practical examination

Chapter 5 TORSION TEST

- 5-1 Torsion test
- 5-2 Specimen
- 5-3 Torsion testing machine
- 5-4 Test procedure
- 5-5 For teachers
- 5-6 Model assessment sheet
- 5-7 Assignment to determine mechanical properties in torsion test
- 5-8 Assignment for practice
- 5-9 Model assignment slips for practical examination

Chapter 6 TRANSVERSE TEST

- 6-1 Transverse test
- 6-2 Specimen
- 6-3 Supports and loading
- 6-4 Important point
- 6-5 Test procedure
- 6-6 Observation
- 6-7 For teachers
- 6-8 Model assessment sheet
- 6-9 Assignments to determine mechanical properties in transverse test
- 6-10 Assignment for practice
- 6-11 Model assignment slips for practical examination

Chapter 7 IMPACT TEST

- 7-1 Impact test
- 7-2 Principle of impact test
- 7-3 Types of impact test and specimen
- 7-4 Procedure for test
- 7-5 For teachers
- 7-6 Model assessment sheet
- 7-7 Assignments to determine mechanical properties in impact test
- 7-8 Assignment for practice
- 7-9 Model assignment slips for practical examination

Chapter 8 HARDNESS TEST

- 8-1 Hardness test
- 8-2 Types of test
- 8-3 Brinell hardness test
- 8-3-1 Specimen for test
- 8-3-2 Principle of test
- 8-3-3 Procedure for test
- 8-4 Precautions
- 8-5 Rockwell test
- 8-5-1 Procedure for rockwell test
- 8-6 Observation (Report)
- 8-7 For teachers
- 8-8 Model assessment sheet
- 8-9 Model assignment slips for practical examination

Chapter 9 FATIGUE TEST

- 9-1 Fatigue test
- 9-2 Types of stress employed in fatigue test
- 9-3 Reverse bending type fatigue test
- 9-4 Procedure
- 9-5 For teachers
- 9-6 Model assessment sheet
- 9-7 Assignment on fatigue test
- 9-8 Assignment for practice

Chapter 10 BEND TEST

- 10-1 Bend test
- 10-2 Specimen preparation
- 10-3 Method of test
- 10-4 Machine used for bend test
- 10-5 For teachers
- 10-6 Model assessment sheet

Chapter 11 SOME EXPERIMENTS USING E.S.A. TECHNIQUE

- 11-1 Introduction and experiments
- 11-2 For teachers

Chapter 12 MECHANICAL EXTENSOMETERS

- 12-1 Introduction
- 12-2 Types of extensometers
- 12-3 For teachers

Chapter 13 PRESENTATION OF REPORT

- 13-1 Presentation of report
- 13-2 Front page or cover page
- 13-3 Other pages
- 13-4 Special coverage
- 13-5 Final submission
- 13-6 For teachers

Chapter 14 PLANNING A STRENGTH OF MATERIALS LABORATORY

- 14-1 Planning of laboratory
- 14-2 Equipments required for the laboratory
- 14-3 Furniture and other requirements

Chapter 15 WORKING MODELS IN EXPERIMENTAL MECHANICS OF SOLIDS

- 15-1 Introduction
- 15-2 Model for column buckling concept
- 15-3 Model for concept of stability
- 15-4 Model for concept of elongation
- 15-5 Bracket connection
- 15-6 Model for influence diagram for bending moment
- 15-7 Model for strain energy concept due to suddenly applied load
- 15-8 Working model: springs in parallel
- 15-9 Torsion test

Chapter 16 OBJECTIVE EXPERIMENTS

- 16-1 Introduction
- 16-2 Tension test
- 16-3 Compression test
- 16-4 Torsion test
- 16-5 Impact test
- 16-6 Transverse test
- 16-7 Hardness test
- 16-8 Test on compound spring
- 16-9 Fatigue test
- 16-10 General questions

APPENDICES:

- A Some useful Indian Standards for physical tests
- B Elastic constant, Rankine's constant for different Materials
- C Typical properties of material used in engineering
- D Formula useful in material testing
- E Loading arrangement on beam for transverse test
- F Some useful information about SI unit
- G Symbolic use of some useful Greek alphabet

SUBJECT INDEX