FIFTH EDITION

A TEXTBOOK OF

STRENGTH OF MATERIALS

(Mechanics of Solids)

• S.I. Units •

Dr. R.K. Bansal

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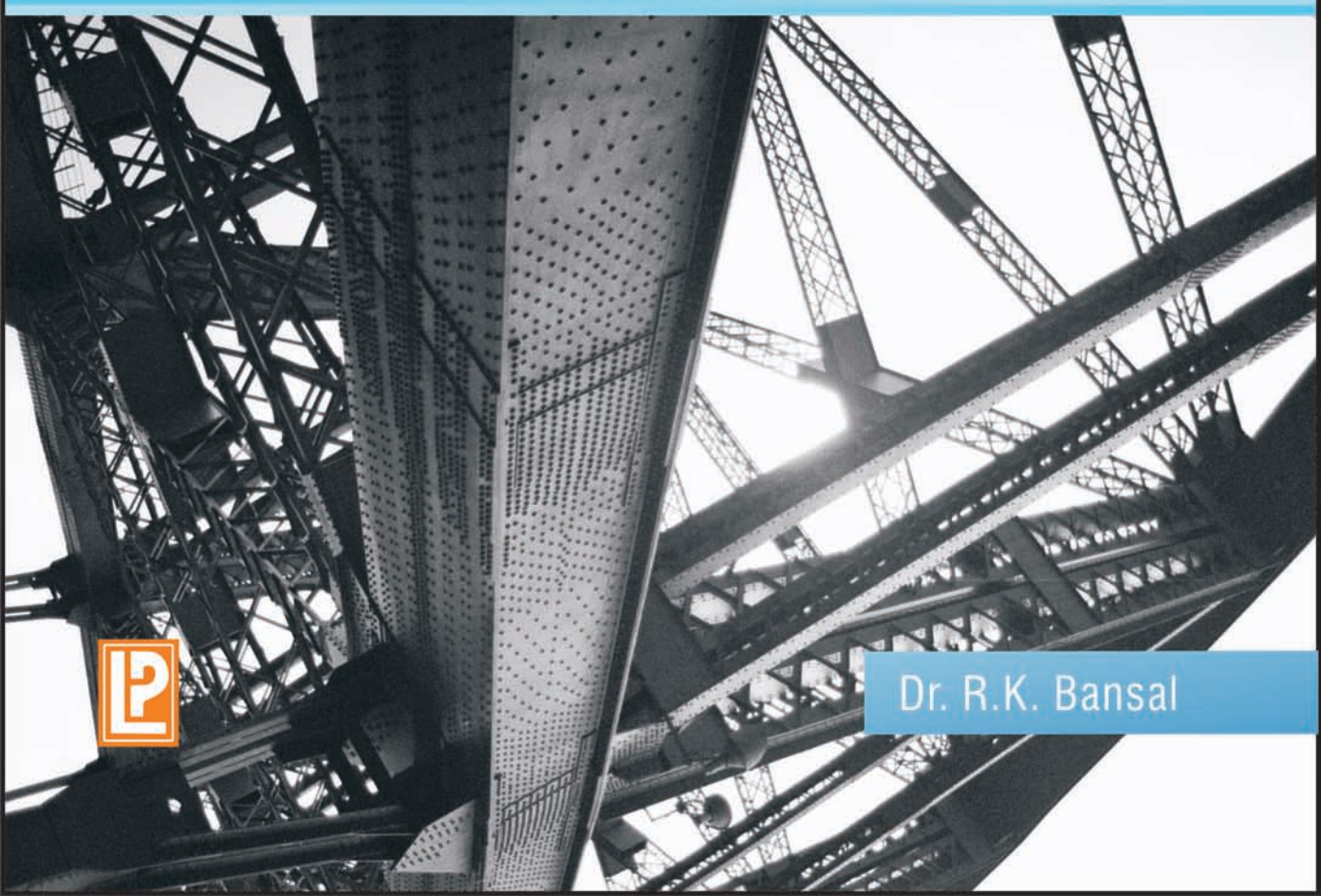

Dr. R.K. Bansal

A TEXTBOOK OF

STRENGTH OF MATERIALS

[Mechanics of Solids]

(In S.I. Units)

[For Degree, U.P.S.C. (Engg. Services), GATE and Other Competitive Examinations]

By

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Dedicated
to
The loving memory
of
my daughter, Babli

PREFACE TO THE FIFTH EDITION

The popularity of the fourth edition and reprints of the book **A Textbook of Strength of Materials** amongst the students and the teachers of the various Indian universities of the country, has prompted the bringing out of the fifth edition of the book so soon. The fifth edition has been thoroughly revised and brought up-to-date. A large number of problems from different B.E. degree examinations upto 2005 of Indian universities and other examining bodies, such as Institution of Engineers, U.P.S.C. (Engineering Services) and GATE have been selected and have been solved at proper places in this edition in S.I. Units.

Four advanced topics of Strength of Materials such as stresses due to rotation in thin and thick cylinders, bending of curved bars, theories of failure of the material and unsymmetrical bending and shear centre have been added. These chapters have been written in such a simple and easy-to-follow language that even an average student can understand easily by self-study.

In the chapter of 'Columns and Struts', the advanced articles such as columns with eccentric load, with initial curvature and beam columns have been included. Also in the chapter of 'Principal Stresses and Strains', strain on an oblique plane and Mohr's strain circle have been added.

The notations in this edition have been used up-to-date by the use of sigma and tau for stresses.

The objective type multiple-choice questions are often asked in the various competitive examinations. Hence a large number of objective type questions with answers have been added at the end of the book.

Also a large number of objective type questions which have been asked in most of competitive examinations such as Engineering Services Examination and GATE with answers and explanation have been incorporated in this edition.

With these editions, it is hoped that the book will be quite useful for the students of different branches of Engineering at various Engineering Institutions.

I express my sincere thanks to my colleagues, friends, students and the teachers of different Indian universities for their valuable suggestions and recommending the book to their students.

Suggestions for the improvement of this book are most welcome and would be incorporated in the next edition with a view to make the book more useful.

—Author

PREFACE TO THE FIRST EDITION

I am glad to present the book entitled, **A Textbook of Strength of Materials** to the engineering students of mechanical, civil, electrical, aeronautical and chemical and also to the students of A.M.I.E. Examination of Institution of Engineers (India). The course-contents have been planned in such a way that the general requirements of all engineering students are fulfilled.

During my long experience of teaching to the engineering students for the past 20 years, I have observed that the students face difficulty in understanding clearly the basic principles, fundamental concepts and theory without adequate solved problems along with the text. To meet this very basic requirement to the students, a large number of the questions taken from the examinations of the various universities of India and from other professional and competitive examinations (such as Institution of Engineers, and U.P.S.C. Engineering Service Examinations) have been solved along with the text, in S.I. units.

This book is written in a simple and easy-to-follow language, so that even an average students can grasp the subject by self-study. At the end of each chapter, highlights, theoretical questions and many unsolved numerical problems with answers are given for the students to solve them.

I am thankful to my colleagues, friends and students who encouraged me to write this book. I am grateful to Institution of Engineers (India), various universities of India and those authorities whose work have been consulted and gave me a great help in preparing this book.

I express my appreciation and gratefulness to my publisher, Shri R.K. Gupta (a Mechanical Engineer) for his most co-operative, painstaking attitude and untiring efforts for bringing out the book in a short period.

Smt. Nirmal Bansal deserves special credit as she not only provided an ideal atmosphere at home for book writing but also gave inspiration and valuable suggestions.

Though every care has been taken in checking the manuscripts and proof reading, yet claiming perfection is very difficult. I shall be very grateful to the readers and users of this book for pointing any mistakes that might have crept in. Suggestions for improvement are most welcome and would be incorporated in the next edition with a view to make the book more useful.

—Author

CONTENTS

Chapters *Pages*

Chapter 1. Simple Stresses and Strains 1—58

1.1. Introduction ... 1
1.2. Stress ... 1
1.3. Strain ... 2
1.4. Types of Stresses ... 2
1.5. Elasticity and Elastic Limit ... 5
1.6. Hooke's Law and Elastic Modulii ... 6
1.7. Modulus of Elasticity (or Young's Modulus) ... 6
1.8. Factor of Safety ... 6
1.9. Constitutive Relationship between Stress and Strain ... 6
1.10. Analysis of Bars of Varying Sections ... 14
1.11. Analysis of Uniformly Tapering Circular Rod ... 24
1.12. Analysis of Uniformly Tapering Rectangular Bar ... 27
1.13. Analysis of Bars of Composite Sections ... 30
1.14. Thermal Stresses ... 42
1.15. Thermal Stresses in Composite Bars ... 44
1.16. Elongation of a Bar Due to its Own Weight ... 50
1.17. Analysis of Bar of Uniform Strength ... 51
Highlights ... 53
Exercise ... 54

Chapter 2. Elastic Constants 59—84

2.1. Introduction ... 59
2.2. Longitudinal Strain ... 59
2.3. Lateral Strain ... 59
2.4. Poisson's Ratio ... 60
2.5. Volumetric Strain ... 62
2.6. Volumetric Strain of a Cylindrical Rod ... 68
2.7. Bulk Modulus ... 70
2.8. Expression for Young's Modulus in Terms of Bulk Modulus ... 70
2.9. Principle of Complementary Shear Stresses ... 73
2.10. Stresses on Inclined Sections when the Element is Subjected to Simple Shear Stresses ... 74
2.11. Diagonal Stresses Produced by Simple Shear on a Square Block ... 76
2.12. Direct (Tensile and Compressive) Strains of the Diagonals ... 77
2.13. Relationship between Modulus of Elasticity and Modulus of Rigidity ... 78
Highlights ... 81
Exercise ... 82

Chapter 3. Principal Stresses and Strains 85—142

3.1. Introduction ... 85
3.2. Principal Planes and Principal Stresses ... 85
3.3. Methods of Determining Stresses on Oblique Section ... 85
3.4. Analytical Method for Determining Stresses on Oblique Section ... 85

Chapters *Pages*

3.5. Mohr's Circle ... 123
3.6. Strain on an Oblique Plane ... 133
3.7. Mohr's Strain Circle ... 137
Highlights ... 137
Exercise ... 139

Chapter 4. Strain Energy and Impact Loading 143—170

4.1. Introduction ... 143
4.2. Some Definitions ... 143
4.3. Expression for Strain Energy Stored in a Body when the Load is Applied Gradually ... 143
4.4. Expression for Strain Energy Stored in a Body when the Load is Applied Suddenly ... 145
4.5. Expression for Strain Energy Stored in a Body when the Load is Applied with Impact ... 152
4.6. Expression for Strain Energy Stored in a Body due to Shear Stress ... 165
Highlights ... 166
Exercise ... 167

Chapter 5. Centre of Gravity and Moment of Inertia 171—236

5.1. Centre of Gravity ... 171
5.2. Centroid ... 171
5.3. Centroid or Centre of Gravity of Simple Plane Figures ... 171
5.4. Centroid (or Centre of Gravity) of Areas of Plane Figures by the Method of Moments ... 171
5.5. Important Points ... 173
5.6. Area Moment of Inertia ... 195
5.7. Radius of Gyration ... 196
5.8. Theorem of the Perpendicular Axis ... 196
5.9. Theorem of Parallel Axis ... 197
5.10. Determination of Area Moment of Inertia ... 198
5.11. Mass Moment of Inertia ... 212
5.12. Determination of Mass Moment of Inertia ... 213
5.13. Product of Inertia ... 219
5.14. Principal Axes ... 220
5.15. Principal Moments of Inertia ... 221
Highlights ... 229
Exercise ... 230

Chapter 6. Shear Force and Bending Moment 237—294

6.1. Introduction ... 237
6.2. Shear Force and Bending Moment Diagrams ... 237
6.3. Types of Beams ... 237
6.4. Types of Load ... 238
6.5. Sign Conventions for Shear Force and Bending Moment ... 239
6.6. Important Points for Drawing Shear Force and Bending Moment Diagrams ... 240
6.7. Shear Force and Bending Moment Diagrams for a Cantilever with a Point Load at the Free End ... 241
6.8. Shear Force and Bending Moment Diagrams for a Cantilever with a Uniformly Distributed Load ... 244

Chapters *Pages*

6.9. Shear Force and Bending Moment Diagrams for a Cantilever Carrying a Gradually Varying Load ... 252
6.10. Shear Force and Bending Moment Diagrams for a Simply Supported Beam with a Point Load at Mid-point ... 254
6.11. Shear Force and Bending Moment Diagrams for a Simply Supported Beam with an Eccentric Point Load ... 256
6.12. Shear Force and Bending Moment Diagrams for a Simply Supported Beam Carrying a Uniformly Distributed Load ... 258
6.13. Shear Force and Bending Moment Diagrams for a Simply Supported Beam Carrying a Uniformly Varying Load from Zero at Each End to w Per Unit Length at the Centre ... 266
6.14. Shear Force and B.M. Diagrams for a Simply Supported Beam Carrying a Uniformly Varying Load from Zero at one End to w Per Unit Length at the Other End ... 268
6.15. Shear Force and Bending Moment Diagrams for Over-hanging Beams ... 272
6.16. S. F. and B. M. Diagrams for Beams Carrying Inclined Load ... 281
6.17. Shear Force and Bending Moment Diagrams for Beams Subjected to Couples ... 286
6.18. Relations between Load, Shear Force and Bending Moment ... 289
Highlights ... 290
Exercise ... 291

Chapter 7. Bending Stresses in Beams **295—344**

7.1. Introduction ... 295
7.2. Pure Bending or Simple Bending ... 295
7.3. Theory of Simple Bending with Assumptions Made ... 296
7.4. Expression for Bending Stress ... 297
7.5. Neutral Axis and Moment of Resistance ... 298
7.6. Bending Stresses in Symmetrical Sections ... 300
7.7. Section Modulus ... 303
7.8. Section Modulus for Various Shapes or Beam Sections ... 303
7.9. Bending Stress in Unsymmetrical Sections ... 315
7.10. Strength of a Section ... 323
7.11. Composite Beams (Flitched Beams) ... 330
Highlights ... 340
Exercise ... 341

Chapter 8. Shear Stresses in Beams **345—380**

8.1. Introduction ... 345
8.2. Shear Stress at a Section ... 345
8.3. Shear Stress Distribution for Different Sections ... 351
Highlights ... 376
Exercise ... 377

Chapter 9. Direct and Bending Stresses **381—412**

9.1. Introduction ... 381
9.2. Combined Bending and Direct Stresses ... 381
9.3. Resultant Stress when a Column of Rectangular Section is Subjected to an Eccentric Load ... 382
9.4. Resultant Stress when a Column of Rectangular Section is Subjected to a Load which is Eccentric to both Axes ... 390

Chapters *Pages*

9.5. Resultant Stress for Unsymmetrical Columns with Eccentric Loading ... 397
9.6. Middle Third Rule for Rectangular Sections (*i.e.*, Kernel of Section) ... 402
9.7. Middle Quarter Rule for Circular Sections (*i.e.*, Kernel of Section) ... 404
9.8. Kernel of Hollow Circular Section (or Value of Eccentricity for Hollow Circular Section) ... 405
9.9. Kernel of Hollow Rectangular Section (or Value of Eccentricity for Hollow Rectangular Section) ... 406
Highlights ... 409
Exercise ... 410

Chapter 10. Dams and Retaining Walls **413—468**

10.1. Introduction ... 413
10.2. Types of Dams ... 413
10.3. Rectangular Dams ... 413
10.4. Stresses Across the Section of a Rectangular Dam ... 417
10.5. Trapezoidal Dam having Water Face Inclined ... 428
10.6. Stability of a Dam ... 434
10.7. Retaining Walls ... 447
10.8. Rankine's Theory of Earth Pressure ... 449
10.9. Surcharged Retaining Wall ... 459
10.10. Chimneys ... 462
Highlights ... 464
Exercise ... 466

Chapter 11. Analysis of Perfect Frames **469—514**

11.1. Introduction ... 469
11.2. Types of Frames ... 469
11.3. Assumptions Made in Finding Out the Forces in a Frame ... 470
11.4. Reactions of Supports of a Frame ... 470
11.5. Analysis of a Frame ... 471
Highlights ... 508
Exercise ... 508

Chapter 12. Deflection of Beams **515—558**

12.1. Introduction ... 515
12.2. Deflection and Slope of a Beam Subjected to Uniform Bending Moment ... 515
12.3. Relation between Slope, Deflection and Radius of Curvature ... 517
12.4. Deflection of a Simply Supported Beam Carrying a Point Load at the Centre ... 519
12.5. Deflection of a Simply Supported Beam with an Eccentric Point Load ... 523
12.6. Deflection of a Simply Supported Beam with a Uniformly Distributed Load ... 530
12.7. Macaulay's Method ... 535
12.8. Moment Area Method ... 550
12.9. Mohr's Theorems ... 552
12.10. Slope and Deflection of a Simply Supported Beam Carrying a Point Load at the Centre by Mohr's Theorem ... 553
12.11. Slope and Deflection of a Simply Supported Beam Carrying a Uniformly Distributed Load by Mohr's Theorem ... 554
Highlights ... 555
Exercise ... 556

Chapters *Pages*

Chapter 13. Deflection of Cantilevers 559—582

13.1. Introduction ... 559
13.2. Deflection of a Cantilever with a Point Load at the Free End by Double Integration Method ... 559
13.3. Deflection of a Cantilever with a Point Load at a Distance '*a*' from the Fixed End ... 561
13.4. Deflection of a Cantilever with a Uniformly Distributed Load ... 562
13.5. Deflection of a Cantilever with a Uniformly Distributed Load for a Distance '*a*' from the Fixed End ... 566
13.6. Deflection of a Cantilever with a Uniformly Distributed Load for a Distance '*a*' from the Free End ... 566
13.7. Deflection of a Cantilever with a Gradually Varying Load ... 572
13.8. Deflection and Slope of a Cantilever by Moment Area Method ... 576
Highlights ... 580
Exercise ... 581

Chapter 14. Conjugate Beam Method, Propped Cantilevers and Beams 583—618

14.1. Introduction ... 583
14.2. Conjugate Beam Method ... 583
14.3. Deflection and Slope of a Simply Supported Beam with a Point Load at the Centre ... 583
14.4. Simply Supported Beam Carrying an Eccentric Point Load ... 585
14.5. Relation between Actual Beam and Conjugate Beam ... 597
14.6. Deflection and Slope of a Cantilever with a Point Load at the Free End ... 597
14.7. Propped Cantilevers and Beams ... 602
14.8. S.F. and B.M. Diagrams for a Propped Cantilever Carrying a Point Load at the Centre and Propped at the Free End ... 603
14.9. S.F. and B.M. Diagrams for a Propped Cantilever Carrying a Uniformly Distributed Load and Propped at the Free End ... 604
14.10. S.F. and B.M. Diagrams for a Simply Supported Beam with a Uniformly Distributed Load and Propped at the Centre ... 610
14.11. Yielding of a Prop ... 614
Highlights ... 615
Exercise ... 616

Chapter 15. Fixed and Continuous Beams 619—678

15.1. Introduction ... 619
15.2. Bending Moment Diagram for Fixed Beams ... 620
15.3. Slope and Deflection for a Fixed Beam Carrying a Point Load at the Centre ... 624
15.4. Slope and Deflection for a Fixed Beam Carrying an Eccentric Point Load ... 628
15.5. Slope and Deflection for a Fixed Beam Carrying a Uniformly Distributed Load Over the Entire Length ... 644
15.6. Fixed End Moments of Fixed Beam Due to Sinking of a Support ... 654
15.7. Advantages of Fixed Beams ... 657
15.8. Continuous Beams ... 658
15.9. Bending Moment Diagram for Continuous Beams ... 658
Highlights ... 675
Exercise ... 676

Chapters *Pages*

Chapter 16. Torsion of Shafts and Springs 679—746

16.1. Introduction ... 679
16.2. Derivation of Shear Stress Produced in a Circular Shaft Subjected to Torsion ... 679
16.3. Maximum Torque Transmitted by a Circular Solid Shaft ... 681
16.4. Torque Transmitted by a Hollow Circular Shaft ... 683
16.5. Power Transmitted by Shafts ... 684
16.6. Expression for Torque in Terms of Polar Moment of Inertia ... 694
16.7. Polar Modulus ... 695
16.8. Strength of a Shaft and Torsional Rigidity ... 695
16.9. Flanged Coupling ... 702
16.10. Strength of a Shaft of Varying Sections ... 705
16.11. Composite Shaft ... 713
16.12. Combined Bending and Torsion ... 717
16.13. Expression for Strain Energy Stored in a Body Due to Torsion ... 720
16.14. Springs ... 728
Highlights ... 741
Exercise ... 743

Chapter 17. Thin Cylinders and Spheres 747—788

17.1. Introduction ... 747
17.2. Thin Cylindrical Vessel Subjected to Internal Pressure ... 747
17.3. Stresses in a Thin Cylindrical Vessel Subjected to Internal Pressure ... 748
17.4. Expression for Circumferential Stress (or Hoop Stress) ... 748
17.5. Expression for Longitudinal Stress ... 749
17.6. Efficiency of a Joint ... 753
17.7. Effect of Internal Pressure on the Dimensions of a Thin Cylindrical Shell ... 757
17.8. A Thin Cylindrical Vessel Subjected to Internal Fluid Pressure and a Torque ... 768
17.9. Wire Winding of Thin Cylinders ... 772
17.10. Thin Spherical Shells ... 777
17.11. Change in Dimensions of a Thin Spherical Shell Due to an Internal Pressure ... 778
17.12. Rotational Stresses in Thin Cylinders ... 780
Highlights ... 783
Exercise ... 784

Chapter 18. Thick Cylinders and Spheres 789—816

18.1. Introduction ... 789
18.2. Stresses in a Thick Cylindrical Shell ... 789
18.3. Stresses in Compound Thick Cylinders ... 797
18.4. Initial Difference in Radii at the Junction of a Compound Cylinder for Shrinkage ... 802
18.5. Thick Spherical Shells ... 808
Highlights ... 813
Exercise ... 814

Chapter 19. Columns and Struts 817—880

19.1. Introduction ... 817
19.2. Failure of a Column ... 817
19.3. Assumptions Made in the Euler's Column Theory ... 818

Chapters *Pages*

19.4. End Conditions for Long Columns ... 818
19.5. Expression for Crippling Load When Both the Ends of the Column are Hinged ... 819
19.6. Expression for Crippling Load When One End of the Column is Fixed and the Other End is Free ... 820
19.7. Expression for Crippling Load When Both the Ends of the Column are Fixed ... 822
19.8. Expression for Crippling Load When One End of the Column is Fixed and the Other End is Hinged (or Pinned) ... 825
19.9. Effective Length (or Equivalent Length) of a Column ... 827
19.10. Limitation of Euler's Formula ... 829
19.11. Rankine's Formula ... 844
19.12. Straight Line Formula ... 856
19.13. Johnson's Parabolic Formula ... 856
19.14. Factor of Safety ... 857
19.15. Formula by Indian Standard Code (I.S. Code) for Mild Steel ... 857
19.16. Columns with Eccentric Load ... 858
19.17. Columns with Initial Curvature ... 862
19.18. Strut with Lateral Load (or Beam Columns) ... 867
Highlights ... 875
Exercise ... 877

Chapter 20. Riveted Joints **881—910**

20.1. Introduction ... 881
20.2. Types of Riveted Joints ... 881
20.3. Chain Riveted Joint ... 882
20.4. Zig-Zag Riveted Joint ... 882
20.5. Diamond Riveted Joint ... 882
20.6. Failure of a Riveted Joint ... 886
20.7. Strength of a Riveted Joint ... 889
20.8. Efficiency of a Riveted Joint ... 890
20.9. Design of a Riveted Joint ... 902
Highlights ... 905
Exercise ... 907

Chapter 21. Welded Joints **911—930**

21.1. Introduction ... 911
21.2. Advantages and Disadvantages of Welded Connections ... 911
21.3. Types of Welded Joints ... 912
21.4. Analysis of a Compound Weld ... 916
21.5. Analysis of Unsymmetrical Welded Sections which are Loaded Axially ... 918
Highlights ... 925
Exercise ... 927

Chapter 22. Rotating Discs and Cylinders **931—968**

22.1. Introduction ... 931
22.2. Expression for Stresses in a Rotating Thin Disc ... 931
22.3. Disc of Uniform Strength ... 948
22.4. Long Cylinders ... 952
Highlights ... 965
Exercise ... 967

Chapters *Pages*

Chapter 23. Bending of Curved Bars 969—1016

23.1. Introduction ... 969
23.2. Assumptions Made in the Derivation of Stresses in a Curved Bar ... 969
23.3. Expression for Stresses in a Curved Bar ... 969
23.4. Determination of Factor 'h^2' for Various Sections ... 976
23.5. Resultant Stress in a Curved Bar Subjected to Direct Stresses and Bending Stresses ... 989
23.6. Resultant Stress in a Hook ... 990
23.7. Stresses in Circular Ring ... 999
23.8. Stresses in a Chain Link ... 1005
Highlights ... 1012
Exercise ... 1014

Chapter 24. Theories of Failure 1017—1050

24.1. Introduction ... 1017
24.2. Maximum Principal Stress Theory ... 1017
24.3. Maximum Principal Strain Theory ... 1018
24.4. Maximum Shear Stress Theory ... 1022
24.5. Maximum Strain Energy Theory ... 1026
24.6. Maximum Shear Strain Energy Theory ... 1030
24.7. Graphical Representation of Theories for Two Dimensional Stress System ... 1032
24.8. Important Points from Theories of Failures used in Design ... 1036
24.9. Energy of Distortion (or Shear Strain Energy) ... 1045
Highlights ... 1048
Exercise ... 1048

Chapter 25. Unsymmetrical Bending and Shear Centre 1051—1090

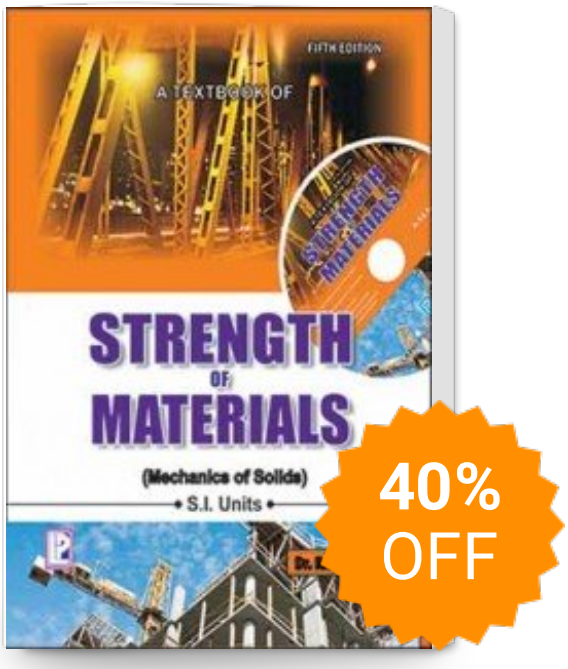
25.1. Introduction ... 1051
25.2. Properties of Beam Cross-section ... 1051
25.3. Stress in Unsymmetrical Bending ... 1053
25.4. Deflection of Beams in Unsymmetrical Bending ... 1055
25.5. Shear Centre ... 1073
25.6. Determination of Shear Centre for Channel Section ... 1073
25.7. Determination of Shear Centre for I-Section ... 1080
Highlights ... 1088
Exercise ... 1089

Chapter 26. Objective Type Questions 1091—1142

26.1. Objective Type Questions Generally Asked in Competitive Examinations ... 1091
26.2. Answers of Objective Type Questions ... 1118
26.3. Objective Type Questions from Competitive Examinations ... 1119
26.4. Answers with Explanations ... 1127

Subject Index 1143—1144

A Textbook of Strength Of Materials Mechanics of Solids By Dr. R.K. Bansal



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