AMMT02 STRENGTH OF MATERIALS

UNIT-1 INTRODUCTION

1.1 Interdisciplinary
1.2 Brief Historical Review
1.3 Organization of the book

UNIT-2 SIMPLE STRESSES AND STRAINS

2.1 General Meaning of stress, Unit of stress, Simple Stresses, Normal stress, Shear stress Strain, Stress Strain Relation,
2.2 Behaviour in Tensions, Behaviour of Materials under compression,
2.3 Nominal stress and true stress
2.4 Behaviour of Materials under Repeated Loadings
2.5 Factor of Safety
2.6 Hooke's Law
2.7 Extension / Shortening of a bar, Bars with cross-sections varying in steps, Bars with continuously varying cross-sections,
2.8 Bars subjected to varying loads, Indeterminate structural problems, Compound Bars
2.9 Temperature stresses, Simple Shear
2.10 Poisson's Ratio, Volumetric Strain
2.11 Elastic Constants, Relationship between Modulus of Elasticity and Modulus of Rigidity, Relationship between Modulus of Elasticity and Bulk Modulus
2.12 Strain Energy due to Direct Stresses sand Impact Loads, Strain Energy due to shear Stresses

UNIT-3 SHEAR FORCE AND BENDING MOMENT DIAGRAMS IN STATICALLY DETERMINATE BEAMS

1.1 Shear Force and Bending Moment
1.2 Sign Convention
1.3 Relationship between load Intensity, Shear Force and Bending Moment
1.4 Shear Force and Bending Moment Diagrams, SFD and BMD for Standard Cases
1.5 SFD and BMD for beams subjected to various loads, Short Cut procedure

UNIT-4 STRESSES IN BEAMS

4.1 Theory of Simple Bending, Moment carrying capacity of a section, Composite beams/flitched beams, Beams of Uniform strength
4.2 Leaf Springs
4.3 Shearing Stresses in Beams, Shear Stresses across a few Standard Sections
4.4 Shear Stresses in Built Up Sections, Limitation of Theory Developed

UNIT-5 DEFLECTIONS OF BEAMS BY DOUBLE INTEGRATION METHOD

5.1 Differential Equation for Deflection, Other Useful Equations,
5.2 Double Integration Method, A few General Cases, Macaulay's Method

UNIT-6 TORSION

6.1 Introduction, Pure Torsion, Assumptions in the Theory of pure Torsion, Derivation of Torsional Equations
6.2 Polar Modulus, Power Transmitted
6.3 Torsional rigidity/ Stiffness of Shafts, Stepped shafts and Composite Shafts
6.4 Shear Keys, Coupling
6.5 Torsion of a Tapering Shaft
6.6 Strain Energy in Torsion
6.7 Closed Coiled Helical Springs
6.8 Torsion of shafts of Non-circular sections

UNIT-7 COMPOUND STRESSES

7.1 Stresses on an Inclined Plane
7.2 Mohr's Circle of Stress
7.3 Compound Stresses in Beams
7.4 Shafts Subjected to combined Bending and Torsion
7.5 Shafts subjected to Combined Action of Bending, Torsion and Axial Thrust

UNIT-8 THIN AND THICK CYLINDERS AND SPHERES

8.1 Stresses in Thin Cylinders
8.2 Changes in Dimensions of Cylinder
8.3 Riveted Cylinders, Wire Wound Cylinders
8.4 Thin Spherical shells, Thick cylinders
8.5 Compound Cylinders, Shrinkage Allowance, Thick spherical shells

UNIT-9 COLUMNS AND STRUTS

9.1 Short columns subjected to Axial Loads
9.2 Eccentrically loaded masonry columns
9.3 Euler's Theory for Axially Loaded Elastic long columns
9.4 Effective Length, Limitations of Euler's theory
9.5 Rankine's Formula, Formula used by Indian Standard Code

UNIT-10 THEORIES OF FAILURES

10.1 Maximum Principal Stress Theory, Maximum Shear Stress Theory
10.2 Maximum Strain Theory, Maximum Strain Energy Theory
10.3 Maximum Distortion Energy Theory

Reference Books:

1. A Textbook of Strength of Materials Book by R.K. Bansal
2. Mechanics of Materials Book by James M. Gere