No	Information of every subject	
1	Unit name:	Strength of material I
2	Code:	ME-31014
3	Classification:	Engineering subject
4	Credit value:	3
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	Engineering Mechanic Theory of Machines Engineering Materials
7	Mode of delivery:	Lecture, Practical
8	Practical	20%
	Mid-term/ final Examination	70%
	Viva	5%
	Tutorial &Assignment	5%
9	Academic staff teaching unit:	
10	Course outcome of unit: In this course ,students will be a. To explain the stresses and strains subjected to the various load at the various sections, about the elastic constant. b. To determine the stresses on oblique section by using analytical method and graphical method, and strain energy and impact loading c. To solve the centre of gravity and movement of inertia of the rectangular and circular pates. d. To compute the values of shear force and bending moment and sketch the shear force and bending moment diagrams. e. To calculate the direct, bending and shear stresses in beams. g. To practice engineering theory concepts using lab equipments	
11	Synopsis of unit: This course is an introduction of mechanics and strength of materials emphasizes fundamental concepts a problems solving techniques. Topic to be covered includes normal stresses, shear stresses , bending stresses ,direct stresses ,normal strain , shear strain ,volumetric strain and moment of inertia.	

12	Topics and Contact Hours: 1 Simple Stresses And Strains 1.1. Introduction 1.2. Stress 1.3. Strain 1.4.Types of Stresses 1.5.Elasticity and Elastic Limit 1.6.Hooke's Law and Elastic Modulii 1.7.Modulus of Elasticity (or Young's Modulus) 1.8.Factor of Safety 1.9.Constitutive Relationship between Stress and Strain 1.10.Analysis of Bars of Varying Sections 1.11.Analysis of Uniformly Tapering Circular Rod 1.12.Analysis of Uniformly Tapering Rectangular Bar 1.13.Analysis of Bars of Composite Sections 1.14.Thermal Stresses 1.15.Thermal Stresses in Composite Bars 1.16.Elongation of a Bar Due to its Own Weight 1.17.Analysis of Bar of Uniform Strength **2 Elastic Constants** 2.1.Introduction 2.2.Longitudinal Strain 2.3.Lateral Strain 2.4.Poission's Ratio 2.5.Volumetric Strain 2.6.Volumetric Strain of a Cylindrical Rod 2.7.Bulk Modulus 2.8.Expression for Young's Modulus in Terms of Bulk Modulus 2.9.Principle of Complementary Shear Stresses 2.10.Stresses on Inclined Sections when the Element is Subjected to Simple Shear Stresses 2.11.Diagonal Stresses Produced by Simple Shear on a Square Block

		2.12.Direct(Tensile and Compressive) Strains of the Diagonals
		2.13.Relationship between Modulus of Elasticity and Modulus of Rigidity
	3	**Principal Stresses and Strain**
		3.1.Introduction
		3.2.Principal Planes and Principal Stresses
		3.3.Methods of Determining Stresses on Oblique Section
		3.4.Analytical Method for Determining Stresses on Oblique Section
		3.5.Graphical Method for Determining Stresses on Oblique Section
		3.6.Mohr's Circle
	4	**Strain Energy and Impact Loading**
		4.1.Introduction
		4.2.Some Definitions
		4.3.Expression for Strain Energy Stored in a Body when the Load is Applied Gradually
		4.4.Expression for Strain Energy Stored in a Body when the Load is Applied Suddenly
		4.5.Expression for Strain Energy Stored in a Body when the Load is Applied with Impact
		4.6.Expression for Strain Energy Stored in a Body due to Shear Stress
	5	**Centre of Gravity and Moment of Inertia**
		5.1.Centre of Gravity
		5.2.Centroid
		5.3.Centroid or Centre of Gravity of Simple Plane Figures
		5.4.Centroid (or Centre of Gravity) of Areas of Plane Figures
		5.5.Important Points
		5.6.Area Moment of Inertia
		5.7.Radius of Gyration
		5.8.Theorem of the Perpendicular Axis
		5.9.Theorem of Parallel Axis
		5.10.Determination of Area Moment of Inertia
		5.11.Mass Moment of Inertia

		6.16.S.F. and B.M. Diagrams for Beams Carrying Inclined Load 6.17.Shear Force and Bending Moment Diagrams for Beams Subjected to Couples 6.18.Relations between Load, Shear Force and Bending Moment
	7	**Bending Stresses in Beams** 7.1.Introduction 7.2.Pure Bending or Simple Bending 7.3.Theory of Simple Bending with Assumptions Made 7.4.Expression for Bending Stress 7.5.Neutral Axis and Moment of Resistance 7.6.Bending Stresses in Symmetrical Sections 7.7.Section Modulus 7.8.Section Modulus for Various Shapes or Beam Sections 7.9.Bending Stress in Unsymmetrical Sections 7.10.Strength of a Section 7.11.Composite Beams (Fletched Beams)
	8	**Shear Stresses in Beams** 8.1.Introduction 8.2.Shear Stress at a Section 8.3.Shear Stress Distribution for Different Sections
	9	**Direct and Bending Stresses** 9.1.Introduction 9.2.Combined Bending and Direct Stresses 9.3.Resultant Stress when a Column of Rectangular Section is Subjected to an Eccentric Load 9.4. Resultant Stress when a Column of Rectangular Section is Subjected to a Load which is Eccentric to both Axes 9.5.Resultant Stress for Unsymmetrical Column with Eccentric Loading 9.6.Middle Third Rule for Rectangular Sections (i.e., Kernel of Section)

	9.7.Middle Quarter Rule for Circular Sections (i.e., Kernel of Section) 9.8.Kernel of Hollow Circular Section (or Value of Eccentricity for Hollow Circular Section) 9.9.Kernel of Hollow Rectangular Section (or Value of Eccentricity for Hollow Rectangular Section)
	Main Reference: **STRENGTH OF MATERIALS, S.I UNITS, REVISED FOURTH EDITION** DR.R.K.Bansal
	Additional references: MECHANICS OF MATERIALS, JAMES M. GERE BARRYJ. OODNO