

Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering & Technology				II Year B.Tech. (Civil Engineering)		
Course Code & Name	Instructions Hours per Semester and Credits					
3RVPC1 Applied Mechanics & Strength of Material	Classroom Instruction (CI)		Lab Instruction (LI)	Term Work (TW) and Self Learning (SL)	Total no. of Hours Per semester	Total Credits (Total Hours/30)
	L	T	P	TW+SL	120	4
	20	10	20	70		

Course Learning Objectives:

1. To find the centroid and moment of inertia of different types of cross sections.
2. To analyze different types of trusses and to find out the forces in the members.
3. To understand the development of strains & stresses in solids and their relationships
4. To develop concept of complex stresses and their treatment to find maximum value of a stress.
5. To Understand the concept of strain energy stored in a body of varying section

Prerequisites: Engineering Physics, Engineering Mathematics

COURSE CONTENTS

Unit I: Geometrical Properties of Sections

Centroid: Definition of centroid and Centre of gravity – Centroid of regular geometrical figures, Centroid of symmetric and anti-symmetric practical Sections, Built up structural sections-Numerical problems.

Moment of Inertia: Definition and notation of Moment of Inertia, Polar moment of inertia, Radius of gyration, Parallel and perpendicular axes theorems; M.I. of regular geometrical plane sections, MI of symmetric, asymmetric, and built up sections.

Unit II: Analysis of Trusses

Determinate and indeterminate frames, Classification of frames, Perfect and imperfect frames, Deficient and redundant frames, Assumptions, Analysis of statically determinate pin-jointed frames method of joints, method of section and Graphical method.

Virtual work: Concept and principle of virtual work, application of virtual work for problems on beam.

Unit III: Simple Stress and Strain

Mechanical properties of materials: strength, stiffness, elasticity, plasticity, toughness, hardness, ductility etc. Normal stress and shear stress, Normal strain and shear strain, Hooke's law, Poisson's, Deformation of axially loaded bars of constant and varying section, Principle of superposition. Composite sections, Elastic constants, Relationship between elastic constants, Temperature stresses.

Unit IV: Principal Stresses and Principal Strains

Principal Planes. Principal Stress. Stresses on an Oblique Section of a Body subjected to Direct Stress in One direction and Two Mutually Perpendicular Directions. Stresses on an Oblique Section of a Body subjected to Simple Shear Stress. Stresses on an Oblique Section of a Body Subjected to a Direct Stress in One Plane and Two Mutually Perpendicular Directions accompanied by a simple shear Stress. Mohr's circle of stress.

Unit V: Strain Energy

Resilience and Proof Resilience, Modulus of resilience, Strain Energy in Materials subjected to gradually applied load, suddenly applied load, impact load, strain energy stored in a body of varying section, strain energy stored in a body due to shear, Castigliano's theorem, Maxwell reciprocal theorem

Course Outcome:

CO No.	CO	PO
CO1	Evaluate the centroid and second moment of area.	PO-1
CO2	Analyse planar and spatial systems to determine the forces in members of trusses, frames	PO-1, PO-2
CO3	Understand the concept of stress and strain.	PO-2, PO-3, PO-4
CO4	develop concept of complex stresses and their treatment to find maximum value of a stress.	PO-4
CO5	Apply knowledge of strain energy stored in a body to analyse beams.	PO-1, PO-2, PO-3,

Books recommended:

1. R.K. Rajput, strength of materials
1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials; TMH
3. Negi; Strength of materials; TMH
4. Surendra Singh; Strength of Materials,
5. Ramamrutham; Strength of Materials,
6. Subramaniam; Strength of Materials; R; Oxford

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO 1	PSO 2	PSO 3
3RVPC1.CO1	2											3	3	
3RVPC1.CO2	2	3										2	3	
3RVPC1.CO3		2	3	3								2	3	
3RVPC1.CO4			3									2	3	
3RVPC1.CO5	2	3	3									2	3	

List of Practical Assignment:

1. Performance of Tensile test to obtain Tensile properties of the material.
2. Performance of Tensile test to obtain Stress-Strain curve for Different Material.
3. Performance of Compressive test to obtain Compressive properties of the material.
4. Performance of Shear test to obtain Shear properties of the material.
5. Performance of Bending test to obtain Bending properties of the material.
6. Performance of Brinell Hardness Test.
7. Performance of Vickers Hardness Test.
8. Performance of Impact test to obtain Impact Strength of the materials.