

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme		Bachelor of Technology			Branch/Spec.		Civil Engineering		
Semester		III			Version		2.0.0.0		
Effective from Academic Year			2026-27		Effective for the Batch admitted in			July 2025	
Course Code		2CI3202		Course Name		Mechanics of Structures			
Teaching Scheme					Examination Scheme (Marks)				
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	03	00	01	00	04	Theory	40	60	100
Hours	03	00	02	00	05	Practical	30	20	50
Pre-requisites									

Course Outcomes									
On successful completion of the course, the students will be able to:									
CO1	To understand the behavior of engineering materials by studying stresses and strains in elastic, isotropic, homogeneous, composite, prismatic, and non-prismatic members.								
CO2	Evaluate bending and shearing stresses in beams of various cross-sections and determine strength and stiffness parameters.								
CO3	To analyze principal stresses in beams of different cross-sections using analytical methods and Mohr's circle of stress and strain.								
CO4	To evaluate torsion in circular shafts and the stability of columns and struts using theoretical concepts and codal design criteria.								
CO5	To analyze structural members and perfect frames subjected to direct and bending stresses using appropriate analytical methods.								
Theory Syllabus									
Unit	Content								Hrs.
1	Stresses and Strains Elastic, homogeneous, isotropic materials, limit of elasticity and proportionality, yield limit, ultimate strength, strain hardening, section of composite materials, prismatic and non-prismatic sections. Strains: Linear, shear, lateral, thermal and volumetric, Poisson's ratio. Stresses: Normal stresses axial- tensile and compressive, shear and complementary shear, thermal and hoop. Applications to composite material stepped and tapered bars.								9
2	Bending Stresses in Beams Introduction, simple bending, theory of simple bending, moment of resistance, modulus of section, beam of uniform section, composite section, laminated spring.								8
3	Shearing Stresses in Beams Introduction, shear stress distribution for beam of rectangular, circular, triangle and I- section.								6
4	Principal Stresses and Strains Principal planes, principle stresses, Analytical method for principal stress, Mohr's circle of stress and strain, Theories of failure.								5
5	Torsion Basic assumption, Torsion formula, Design of circular sections, Angle of twist, Shearing stress, Deformation, power transmitted by shaft.								5
6	Columns and Struts Short columns subjected axial forces and bending moments, engineering problems, long columns, stability and equilibrium, ranking formula, Indian standard formula, criteria for design of columns.								3
7	Direct and Bending Stresses Members subjected to eccentric loads, middle third rule, and kernel of section, chimney subjected to wind pressure, retaining walls and dams subjected to hydraulic pressure.								5

8	Analysis of Perfect Frame Types of frames, Assumptions for forces in the members of a perfect frames, Analytical methods for forces, Method of joints, Method of sections(Moments), Force table, Cantilever trusses, Structures with one end hinged and other freely supported on rollers and carrying horizontal loads, Miscellaneous structures.	4
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Practical Content

The practical work shall be based on experimental and analytical work on the topics mentioned above and will be defended by the candidates.

Text Books

1	S. B. Junnarkar and H.J. Shah, Mechanics of structure vol-I ,Charotar publishing house, Anand
2	S Ramamrutham, Strength of Materials, Dhanpat Rai & Sons.

Reference Books

1	R. S. Khurmi , Strength of Materials ,S. Chand & Co. New Delhi
2	M. Chakraborti, Strength of Materials, S. K. Kataria & Sons.
3	E. P. Popove, Engineering Mechanics Of Solids, PHI Publication.
4	Gere & Timoshenko, Mechanics Of Materials, CBS Publisher.

ICT/MOOCs Reference

1	http://www.dphu.org/uploads/attachements/books/books_341_0.pdf
2	https://nptel.ac.in/courses/122102004/5

Mapping of CO with PO and PSO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS O1	PS O2	PS O3
CO1	3	2	1	1	0	0	0	0	0	0	0	1	3	1	1
CO2	2	3	1	2	0	0	0	0	0	0	0	1	3	1	1
CO3	2	3	2	2	1	0	0	0	0	0	0	1	3	2	1
CO4	2	3	1	3	1	1	1	0	0	0	1	1	3	2	2
CO5	1	3	1	3	0	0	0	0	1	0	0	1	3	1	2

