

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Diploma Engineering	Branch	Civil Engineering					
Semester	III	Version	1.0.0.0					
Effective from Academic Year	2019-20	Effective for the batch Admitted in	June 2019					
Subject code	1CI2301	Subject Name	Mechanics of Structure - I					
Teaching scheme			Examination scheme (Marks)					
(Per week)	Lecture(DT)	Practical(Lab.)	Total	CE	SEE	Total		
	L	TU	P	TW				
Credit	4	0	1	0	5	Theory 40	60	100
Hours	4	0	2	0	6	Practical 30	20	60

Pre-requisites:

Engineering Mechanics (1ES202)

Course Learning Outcomes:

Successful completion of the course shall make student be able to :

- CO1. Understand statically determinate structural components.
- CO2. Understand behavior of the structural components under certain loading conditions.
- CO3. Understand material properties for different loading conditions.
- CO4. Analyse the structural components with axial or eccentric loading conditions.
- CO5. Apply the knowledge to real life problems.

Course Content

Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 Moment of Inertia (MI)	1.1 Centre of gravity & Centroid 1.2 Moment of Inertia & its Importance 1.3 Parallel & Perpendicular Axis Theorem 1.4 Formula of Moment of Inertia of solid & Hollow sections like Rectangle, Triangle, circle 1.6 Moment of Inertia about C.G for I section, H section, Channel Section, Angle Section, T Section and Built up Section.	Compute moment of inertia of symmetric, axisymmetric & asymmetric structural sections	10	08
UNIT – 2 Direct Stress & Strain	2.1 Different types of structures and loads 2.2 Direct stress, linear strain, hook's law Stress strain curve of mild steel. Modulus of elasticity. 2.3 Lateral strain and Poisson's ratio with numerical problems 2.4 Basics concepts of shear stress, shear strain & shear modulus 2.6 Bulk modulus, volumetric strain along with numerical problems 2.6 Differentiate between sudden, gradual & Impact loads	Compute strain energy under different types of loading, material properties under longitudinal & lateral loads	05	08

	2.7 Define strain energy, proof resilience For sudden, gradual & impact load			
UNIT – 3 Combined Direct & Bending Stresses	3.1 Formula Direct & Bending Stresses of various structural components 3.2 Eccentricity, Limit of Eccentricity 3.3 Core of section for Rectangular & Circular (Hollow & Solid) 3.4 Formulae for combined stresses on sections subjected to eccentric loads 3.6 Considering Uniaxial & Biaxial eccentricity 3.6 Stress distribution diagrams	Draw stress distribution diagram & calculate direct & bending stresses of various structural components	10	10
UNIT – 4 Shear Force and Bending Moment Diagram	4.1 Define Determinate and Indeterminate beams with example 4.2 Explain different types of beam and support with reaction 4.3 Define Shear Force (SF) and Bending Moment (BM) at a section, its sign conventions 4.4 SF and BM for cantilever, simply supported and over hanging beam 4.6 Explain Point of Contraflexure 4.6 Problems of SF, BM and drawing their diagrams with different loads	Draw shear force & bending moment diagram for statically determinate beams	15	16
UNIT – 5 Bending & Shear Stresses In Beam	5.1 Bending Theory Equation, Bending stress, Sectional Modulus, Neutral Axis 5.2 Apply Bending theory to Statically determinate beams having rectangular or circular section 5.3 Problems on bending stress in beam section 5.4 Shear Stress equation, Shear Stress Distribution Diagram for Solid & Hollow Rectangular And Circular Section. Apply shear Stress Equation & Draw Shear Stress Distribution Diagram for I, H, T, Channel & Angle Section. 5.5 Problems on shear stress distribution at different levels for simple cross sections and draw their distribution curves	Draw and understand shear and bending stress distribution on the beams	10	10
UNIT – 6 Slope & Deflection	6.1 Concept of Slope & Deflection 6.2 Draw deflection curve in different types of beams under different loads and support conditions. 6.3 Formula of Slope & Deflection for Cantilever Beam subjected to Point Load at free end, point load not at free end and with UDL along full Span	Calculate deflection & slope in cantilever and simply supported beams	10	08

	6.4 Formula of Slope & Deflection for S.S Beam subjected to Central Point Load and with UDL along full Span			
			Total	60
				60

List of Practical		
No.	Unit	Name of Practical
1	1	Solve at least six problems pertaining to Moment of Inertia (MI).
2	2	Conduct tension test on a given sample of mild steel and draw stress strain curve.
5	2	Conduct compressive strength test on concrete cube.
5	5	Solve at least Six real life problems based on combined stresses.
5	5	Prepare shear force and bending moment diagrams for at least ten problems.
6	5	Solve at least Six real life problems based on bending & shear stresses' calculation.
7	6	Perform deflection test on a cantilever beam with different sectional properties.
8	6	Perform deflection test on a simply supported beam with different sectional properties.

List of Instruments / Equipment / Trainer Board	
1	Universal testing machine
2	Compression Testing machine
5	A model of simply supported beam
5	A model of cantilever beam

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Strength of Materials	R. S. Khurmi N. khurmi	S. Chand & Company
2	Strength of Materials	S. Ramamrutham	Dhanpat Rai Publishing Company(P) Ltd.
3	Strength of Materials	Dr. B. C. Punamia Er. Ashokkumar Jain Dr. Arun Kumar Jain	Laxmi Publications

Link of Learning Web Resource	
1	https://www.coursera.org/learn/mechanics-1
2	https://nptel.ac.in/courses/105105108

PO & CO Mapping

Sr.No.	Name of PO	Description	Co1	Co2	Co3	Co4	Co5
1	PO 1	Acquire fundamental knowledge of mathematics, science, and civil engineering.	Slight	Slight	Slight	Slight	Moderate
2	PO 2	Design and conduct experiments, as well as analyze and interpret data.	Moderate	Moderate	Moderate	Moderate	Substantial
3	PO 3	Use the techniques, skills, and modern engineering tools necessary for engineering practice	Substantial	Substantial	Substantial	Substantial	Substantial
4	PO 4	Function in multi-disciplinary teams and identify, formulate, and solve engineering problems.	Substantial	Substantial	Substantial	Substantial	Substantial
5	PO 5	Clear understanding of his duties and responsibilities as a civil engineer.	None	None	None	None	None
6	PO 6	Develop effective communication skill and provide leadership for professional development.	None	None	None	None	None
7	PO 7	Engage in life-long learning in civil engineering field and comprehend issues related to environment and sustainable development.	None	None	None	None	None
8	PO 8	Graduate will demonstrate knowledge of professional and ethical responsibilities.	None	None	None	None	Slight
9	PO 9	Incorporate economics and business practice including project and risk management.	None	None	None	None	Slight
10	PO 10	Graduated are able to share their knowledge to the industries as well as society.	None	None	None	None	None

11	PO 11	Graduated will be able to apply their skill and knowledge for the sustainable development of nation.	Slight	Slight	Slight	Slight	Slight
12	PO 12	Graduated are able to learn to work with the team and also with the inter discipliners.	None	None	None	None	None