

GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Civil Engineering				
Semester	IV		Version	1.0.0.0	
Effective from Academic Year		2026-27	Effective for the batch Admitted in		July 2025
Course code	1CI4101	Course Name	Mechanics of Structures–II		

I. TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course code	Course Title	Teaching & Learning Scheme									Examination Scheme							
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
DSC	1CI4101	Mechanics of Structures –II	3	0	1	4	3	0	2	3	8	40	60	100	30	20	50	20	170

Abbreviation:	CL- Classroom Learning	TL - Tutorial Learning	LL - Laboratory Learning
	SLH - Self Learning Hours	NLH - Notional Learning Hours	SLA - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		SA - Summative Assessment

II. PRE-REQUISITES

Basic knowledge of Engineering Mechanics, Mechanics of Structures – I

III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES

Student should be able to

- Apply structural analysis concepts to practical civil engineering problems.
- Interpret structural behavior under different loading and boundary conditions.
- Use analytical results to support safe and economical structural design decisions.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

CO1. Analyze fixed beams and determine bending moments and shear forces.

CO2. Analyze continuous beams and evaluate support reactions and internal forces.

CO3. Determine principal stresses and principal planes for given stress conditions.

CO4. Analyze trusses and calculate forces in members.

CO5. Evaluate column behaviour and calculate critical buckling load.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
Unit-1 Fixed Beam	TLO 1.1 Draw shear force & Bending moment diagram for fixed beams	1.1 Different types of Determinate & Indeterminate Structures. 1.2 Advantages of fixed beam over simply supported beam. 1.3 Concept of analysis by Area Moment method 1.4 Numerical for SF & BM diagrams for fixed beam with central point load &/or UDL over Full Span.	08	08

Unit-2 Continuous Beam	TLO 2.1 Draw Shear force & Bending moment Diagram for continuous beam using three moment theorem. TLO 2.2 Draw Shear force & Bending moment Diagram for continuous beam using moment distribution method.	2.1 Statically indeterminate beams like propped cantilever continuous beams with or without overhang define free moment & fixed end moment diagrams. 2.2 Theorem of three moments. (clapeyron's theorem). 2.3 Formulae to find B.M of a continuous beam using the theorem of three moment method. 2.4 Point of contra flexure & its importance. 2.5 Numerical to draw S.F & B.M diagrams for two or three span continuous beams with different loading and support conditions. 2.6 Stiffness, flexibility, carry over factor & distribution factor. 2.7 Moment distribution method. 2.8 Numerical to draw S.F & B.M diagrams for two or three span continuous beams with different loading and support conditions.	15	12
Unit-3 Principal Stresses & Principal Planes	TLO 3.1 Calculate principal stresses & principal plane on a plane in a strained structural material.	3.1 Formulae for Normal, Tangential & Resultant Stresses due to Direct Orthogonal Stresses & Shear Stress. 3.2 Formulae for Principal Stresses and for Location of Principal Planes. 3.3 Mohr's Circle and its application.	15	12
Unit-4 Analysis of Truss	TLO 4.1 Analyse statically Determinate trusses.	4.1 Perfect & Imperfect Truss 4.2 Various trusses for different spans and Application. 4.3 Analysis of Triangle, North Light & Fan trusses under Panel Point Loads using Graphical & Method of Joint.	12	08
Unit-5 Column & Strut	TLO 5.1 Calculate load carrying capacity of columns & struts.	5.1 Column & Strut 5.2 Short & Long Column 5.3 End Condition of Column and effective Length of Column & Modes of Failure in column 5.4 Radius of Gyration, Slenderness Ratio 5.5 Euler's Crippling Load 5.6 Rankine's load / Buckling Load of Column.	10	05

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL			
Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	LLO 1.1 Apply fundamental concepts of Mechanics of Structures to solve and analyse numerical problems from each unit.	Solve at least six problems based on every unit.	CO1, CO2, CO3
2	LLO 1.2 Determine member forces in trusses using both graphical and analytical methods.	Analyse truss using graphical method (at least three trusses) and verify using analytical method.	CO4
3	LLO 1.3 Identify various end conditions of columns (fixed–fixed, hinged–hinged, fixed–hinged, fixed–free).	Demonstrate End Conditions of Column using suitable model / example.	CO5

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)	
● Prepare a model for different end conditions of the column. ● Collect the photographs of steel structural elements made of I-section, Angle section, Channel section and built-up section. ● Collect the photographs of five different types of truss in the field. ● Prepare a model for different types of truss. ● Analyse a truss using computer aided drafting software. ● Study a roof truss used in an industrial shed or station platform. Analyze member forces using ● Method of Joints ● Method of Sections	

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD	
1	Working Model of End Conditions of Column
2	Compression Testing Machine

IX. LIST OF REFERENCE BOOKS

Sr. No.	Title	Author	Publication
1	Strength of Materials	R S Khurmi, N. Khurmi	S Chand Publications
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

X. LINK OF LEARNING WEB RESOURCE

1	https://www.youtube.com/watch?v=wsJM-LNtmlc&list=PLLy_2iUCG87AgdE8-bSTgt-Id4lhZWf7p
2	https://youtu.be/Hn_iozUo9m4?si=tNHBHdbKdMQhswNw

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Fixed Beam	CO1	8	2	3	3	8
2	Continuous Beam	CO2	12	3	6	6	15
3	Principal Stresses & Principal Planes	CO3	12	4	5	6	15
4	Analysis of Truss	CO4	8	3	4	5	12
5	Column & Strut	CO5	5	2	2	6	10
	Grand Total		45	14	20	26	60

XII. COs AND POs AND PSOs MAPPING

Course outcome (Cos)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	2	0	0	1	3	1	2
CO2	3	3	2	2	0	0	1	3	1	2
CO3	3	3	2	1	0	0	1	3	0	2
CO4	3	3	2	2	0	0	1	3	1	2
CO5	3	3	2	2	1	0	1	3	1	2
Legends: -3- High 2-Moderate/Medium 1-Slight/Low 0-None										