

Sankalchand Patel University
Faculty of Engineering and Technology
First Year Master of Technology in Civil Engineering
(Computer Aided Structural Analysis and Design)
In Effect from Academic Year 2023-24

Branch Name:	Civil Engineering (Computer Aided Structural Analysis & Design)
Semester/Year:	Semester I / First Year
Subject Title:	Design of Masonry & Confined masonry structures (Elective - I)
Subject Code:	2ET2100103T
Pre-requisite:	Building Construction, Elementary Structural Design.

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	0	0	3	24	60	16	40	00	00	00	00	100

Course Objective:

1. To study the Masonry structure (a low cost structural form) for low rise buildings up to G+3 storey.
2. To study the major structural form used in rural and urban part of India.
3. To understand the use of masonry in terms of materials, mechanical properties, behaviors under different types of loads, analysis & design methodology, testing, construction practices etc. for safe, stable and durable structure.

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: Historical Perspective, Masonry Materials, Masonry Design Approaches, Overview of Load Conditions, Compression Behavior of Masonry, Masonry Wall Configurations, Distribution of Lateral Forces.	3	15
2	Strength of Masonry in Compression: Behavior of Masonry under compression, strength and elastic properties, factors influencing the compressive strength masonry, Effects of slenderness and eccentricity, water absorption, curing, ageing and workmanship on compressive strength. Prediction of strength of masonry in Indian context.	6	20
3	Design of load bearing masonry buildings: Concept of basic compressive stress, Permissible compressive stress, reduction factors. Increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses, Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels; Wall carrying axial load, eccentric load with different eccentricity ratios, wall with openings, freestanding wall; Design of load bearing masonry for buildings up to 3 storey's using BIS codal provisions.	8	25
4	Confined Masonry: Introduction to confined Masonry, Failure modes, Flexural Strength, Shear Strength of Reinforced Masonry, Confined Masonry Columns and Beams, Reinforced masonry; Vertical reinforcement at corners and jambs;	8	25
5	Advance Concepts: Strength and ductility; Nonlinear pushover analysis; Performance based design; Vulnerability and fragility analysis.	3	15

Course Outcome:

After learning the course, the students should be able to:

1. To evaluate behaviour of masonry infill walls and procedures for structural assessment and strengthening of existing masonry structures.

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2. To elucidate theories on mechanical behaviour of masonry assemblages under different actions, and introduces students to working stress and limit state approaches to analysis and design of unreinforced, reinforced, confined masonry structures for gravity and lateral loads, including earthquake loads.
3. To Analysis and Design reinforced masonry viable structural according to National Building Code (2016) of India.

Reference Books

1. T. Paulay, M. J. N. Priestley, "Seismic Design of Reinforced Concrete and Masonry Buildings", John Wiley & Sons, Inc., New York.
2. W. Hendry, B. P. Sinha, S. R. Davies, "Design of Masonry Structures", E & F N Spon, Londn UK.
3. S. Sahlin, "Structural Masonry", Prentice Hall, Englewood Cliffs, New Jersey.
4. W. Hendry, "Structural Masonry", Macmillan, Houndmills, Basingstoke.
5. Tomazevic, M, "Earthquake-resistant Design of Masonry Buildings", Imperial College Press.
6. Arya A, Boen T, Ishiyama Y, Martemianov A, Meli R, Scawthorn C, Vargas J and Yaoxian Y , "Guidelines for Earthquake Resistant Non-engineered Construction",

E-Resources (If any):

<https://onlinecourses.nptel.ac.in/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	To evaluate behaviour of masonry infill walls and procedures for structural assessment and strengthening of existing masonry structures.	L-1 L-2and L-5
CLO2	To elucidate theories on mechanical behaviour of masonry assemblages under different actions, and introduces students to working stress and limit state approaches to analysis and design of unreinforced, reinforced, confined masonry structures for gravity and lateral loads, including earthquake loads.	L-3 L-4 and L-5
CLO3	To Analysis and Design reinforced masonry viable structural according to National Building Code (2016) of India.	L-4 and L-6

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CLO1	M	M		M	M	M	M		M			M	M		M
CLO2	M	M		M		M			M			M	M		M
CLO3	M	M	M	M	H	M	M	M	M			H	M	H	M

H: High, M: Medium, L: Low