

DESIGN OF MASONRY STRUCTURES

II Semester: ST

Course Code	Category	Hours / Week			Credits	Maximum Marks		
BSTB15	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			

I. COURSE OVERVIEW:

Masonry structures constitute approximately 85% of the built stock in a developing country such as India; however, a vast majority of this is non-engineered or semi-engineered constructions demonstrating poor performance, particularly under earthquake actions. The current course aims at elucidating 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. The course will also briefly address behaviour of masonry infill walls and procedures for structural assessment and strengthening of existing masonry structures. Students who undertake this course will have an understanding of behavior of structural masonry under different loads, and be able to estimate capacities and design masonry walls and systems.

II. COURSE OBJECTIVES:

The student will try to learn:

I. Structural analysis of load bearing brick and block masonry.

II. Structural design of walls, columns and beams in unreinforced and reinforced masonry.

III. Application of simple structural models for calculation and design of building parts and detailing.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:		
CO 1	Describe about masonry construction	Understand
CO 2	Assess the strength and stability of masonry walls	Evaluate
CO 3	Identify the various interactions involved in structural elements	Apply
CO 4	Describe the effect of curing, ageing and workmanship of a masonry wall	Understand
CO 5	Explain the design aspects of reinforced masonry	Understand
CO 6	Make use of various model techniques for analyzing the components	Apply

IV. SYLLABUS

UNIT -I	INTRODUCTION	Classes: 09
Historical Perspective, Masonry Materials, Masonry Design Approaches, Overview of Load Conditions, Compression Behaviour of Masonry, Masonry Wall Configurations, Distribution of Lateral Forces		
UNIT -II	FLEXURAL STRENGTH	Classes: 09
Flexural Strength of Reinforced Masonry Members: In plane and Out-of-plane Loading. Shear Strength and Ductility of Reinforced Masonry Members		

UNIT -III	INTERACTIONS	Classes: 09
Structural Wall, Columns and Pilasters, behavior of axially loaded columns, axial strength of reinforced masonry columns.		
Retaining Wall, principal types of retaining walls, lateral pressures on retaining walls, external stability of a retaining wall, Pier and Foundation		
UNIT -IV	PRESTRESSED MASONRY	Classes: 09
Stability of Walls, Coupling of Masonry Walls, Openings, Columns, Beams.		
UNIT -V	ELASTIC AND INELASTIC ANALYSIS	Classes: 09
Modeling Techniques, Static Push Over Analysis and use of Capacity Design Spectra.		
Text Books:		
1. Narendra Taly, "Design of Reinforced Masonry Structures", ICC, 2 nd Edition, 2010. 2. Hamid Ahmad A. and Drysdale Robert G, "Masonry Structures: Behavior and Design", 1994. Mechanics of Masonry Structures, Editor: Maurizio Angelillo, 2014.		
Reference Books:		
Earthquake-resistant Design of Masonry Buildings, Toma_evi_Miha, Imperial College Press, 1999.		
Web References:		
http://nptel.ac.in/courses/105102088/28		
E-Text Books:		
http://civil.iisc.ac.in/ksnseminar.pdf		