



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering

Subject Code: 3722019

Semester – II

Subject Name: Design of Masonry Structures

Type of course: Program Elective III

Prerequisite: Building Construction, Elementary Structural Design.

Rationale: Masonry structure is one of the low cost structural form for low rise buildings up to G+3 storey and it is one of the major structural form used in rural India and to some extent in urban part too. Hence this subject will help in developing understanding of 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.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction: Historical Perspective, Masonry Materials, Masonry Design Approaches, Overview of Load Conditions, Compression Behavior of Masonry, Masonry Wall Configurations, Distribution of Lateral Forces.	06
2	Characteristics of masonry constituents: Types of masonry units such as stone, bricks, concrete blocks, clay blocks and stabilized mud blocks. Properties of masonry units like strength, modulus of elasticity and water absorption. Masonry mortars – Classification and properties of mortars, selection of mortars.	08
3	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.	08
4	Shear and Flexure Behavior of Masonry : Bond between masonry unit and mortar, test methods for determining flexural and shear bond strengths, test procedures for evaluating flexural and shear strength, factors affecting bond strength, effect of bond strength on compressive strength, flexure and shear strength of masonry. Flexural strength of reinforced masonry members: In plane and Out-of-plane loading. Concept of Earthquake	10



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering

Subject Code: 3722019

	resistant masonry buildings.	
5	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 storeys using BIS codal provisions.	10

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	20	25	20	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Distinguish from a wide range of materials for their suitability to arrive at feasible and optimal solutions for masonry constructions.	15%
CO-2	Apply knowledge of structural masonry for advanced research and construction procedures.	30%
CO-3	Justify the design of masonry buildings for sustainable development.	30%
CO-4	Check the stability of walls.	25%

List of Experiments: ---

Designed & detailed atleast one full load bearing masonry building. The report shall consist of full analytical treatment, design procedure, references and all necessary drawings in the form of neat dimensioned sketches.



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3722019

Major Equipment: ---

List of Open Source Software/learning website: <http://nptel.ac.in/>