Bachelor of Technology
Civil Engineering

01CI0812: Masonry Structures

Objective of the Course
Objectives of introducing this subject at fourth year level in civil branches are:

- To develop an understanding for implementation of Masonry structures.
- To present fundamental principles and methodologies of design of Masonry structures.
- To categorize, classify and understand the masonry building component.
- To have the ability to analyse and design of masonry structure.

Credits Earned: 4
Students Learning Outcomes

After studying this subject students will be able:

- To understand the behavior of masonry structure
- To make use of fundamental of design methodologies for design of masonry structure.
- To identify different component of masonry structure.
- Become familiar with basic masonry materials, including clay brick, concrete block, mortar, grout, and reinforcing accessories.
- Understand the behavior of reinforced masonry structures under flexure, shear, axial forces, combined flexure and axial forces, and in-plane shear forces.
- Learn the methods of masonry construction and detailing practices.

Teaching and Examination Scheme

Subject Name	Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
	Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
Elementary Design of Structures	3	0	2	4	50	30	20	25	25	150

Detailed Syllabus

Sr.No	Topic name	Hours
1	**Introduction, Masonry units, materials and types:**	**03**
	History of masonry, Characteristics of Brick, stone, clay block, concrete block, stabilized mud block masonry units, Term used in masonry, Masonry materials - Classification and properties of mortars, Selection of mortars.	03
2	**Types of masonry structure**	**12**
	2.1 Stone masonry – Material, classification of stone masonry, Dressing of stone, Application for lifting stones, Joints in stone masonry, Safe permissible load on Stone masonry.	04
	2.2 Brick masonry – Types of bricks, Bond in bricks, Method of brick laying, Defects in brick masonry, Strength of brick masonry, permissible compressive stress of brick masonry, typical structures in brick work.	05

	2.3 Composite masonry – Stone composite masonry, concrete masonry, Hollow clay blocks masonry, reinforcement in brick masonry.	03
3	**Types of wall, Arches and Lintels**	**12**
	3.1 Load bearing wall – types of load bearing wall, Design consideration of wall, Effective dimension of wall, Permissible stress in wall, basic structural analysis and design of wall.	6
	3.2 Cavity wall – Advantages of cavity wall, position of cavity wall, construction of cavity wall.	2
	3.3 Partition wall – Types of partition wall, Requirement of partition wall.	1
	3.4 Lintels and Arches – Classification of lintels, loading on lintels, different terms of arch, Stability of arch, classification and construction of arches	3
4	**strength of masonry**	**08**
	4.1 strength and elastic properties of masonry, behavior of masonry under compressive force, effect of height on compressive strength of masonry, failures of masonry structure under compression, effect of bonding pattern, slenderness, material, workmanship and curing on compressive strength.	06
	4.2 Tests for determining flexural and shear bond strength, factors affecting bond strength, flexure, shear strength of masonry unit.	02
5	**Earthquake resistant masonry buildings**	**07**
	5.1 Behavior of masonry during earthquakes, concepts and design procedure for earthquake resistant masonry, BIS codal provisions, Earthquake resisting feature.	07

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	15%	30%	25%	5%	20%

Instructional Method and Pedagogy

1. Prerequisite of the course and its pattern shall be discussed on the commencement of the course.
2. Lectures shall be conducted in class room using various teaching aids.
3. Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
4. At the end of each unit/topic an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.

Recommended Study Material
Reference Books:

1. Dayaratnam P, “Brick and Reinforced Brick Structures”- Oxford & IBH.
2. Sinha B.P & Davis S.R., “Design of Masonry structures”- E & FN Spon.
3. Hendry A.W.,“Structural masonry”- Macmillan Educaon Ltd., 2nd edion.
4. Curtin, “ Design of Reinforced and Prestressed Masonry”- Thomas Telford.
5. Dr. B.C Punmia, “ Building Constructuion”.
6. Gurucharan Singh, “Building construction and material”.
7. Building Code Requirements for Masonry Structures (TMS 502-08/ACI 530-08/ASCE 5-08)
8. Specifications for Masonry Structures (ACI 530.1-08/ASCE 6-08/TMS 602-08) and Commentary