DESIGN OF MASONRY STRUCTURES

(Professional Elective- II)

Course Code: 20CE1157	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Pre-requisites: Strength of Materials, Structural Analysis, Design of Reinforced Concrete Structures

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Describe about masonry construction (L2)

CO2: Assess the strength and stability of masonry walls (L2)

CO3: Explain the design aspects of reinforced masonry (L2)

CO4: Design a masonry wall (L3)

CO5: Describe the behaviour of reinforced masonry & masonry walls in composite action (L2)

UNIT-I **(10 Lectures)**

MASONRY CONSTRUCTION:

Brick, stone and block masonry units – strength, modulus of elasticity and water absorption of masonry materials –classification and properties of mortars, selection of mortars. Defects and errors in masonry construction, cracks in masonry, types, reasons for cracking, methods of avoiding cracks.

Learning outcomes:

At the end of the unit, the student will be able to

1. Describe the properties of masonry units (L2)
2. Discuss the defects and errors in masonry constructions (L2)
3. Explain about the methods to avoid cracks (L2)

UNIT-II **(10 Lectures)**

STRENGTH AND STABILITY:

Strength and Stability of concentrically loaded masonry walls, effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing, effect of ageing, workmanship, strength formulae and mechanism of failure for masonry subjected to direct compression.

Learning outcomes:

At the end of the unit, the student will be able to

1. Explain the strength and stability of concentrically loaded masonry walls (L2)
2. Discuss the factors affecting the motor strength (L2)
3. Describe the effect of curing, ageing and workmanship of a masonry wall (L2)

UNIT-III **(10 Lectures)**

DESIGN CONSIDERATIONS:

Effective height of walls, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels.

Learning outcomes:

At the end of the unit, the student will be able to

1. Explain the design concept of fixing the effective height of walls (L2)

2. Calculate the slenderness ratio and eccentricity of masonry structures (L3)
3. Explain the concept of load distribution on masonry structures (L2)

UNIT-4 **(10 Lectures)**

DESIGN OF MASONRY WALLS:

Design of load bearing masonry for building up to 3 storeys using IS: 1905 and SP: 20 procedure.

Learning outcomes:
At the end of the unit, the student will be able to
1. Estimate the loads on the load bearing masonry walls (L2)
2. Compute the design stresses in the elements of load bearing masonry walls (L3)
3. Design the masonry walls using IS:1905 and SP-20 (L3)

UNIT-V **(10 Lectures)**

REINFORCED MASONRY & MASONRY WALLS IN COMPOSITE ACTION:

Reinforced masonry and its application, flexural and compression elements of reinforced masonry, shear walls. Composite masonry walls, composite wall beam elements, infilled frames.

Learning outcomes:
At the end of the unit, the student will be able to
1. Explain about reinforced masonry and its applications (L2)
2. Discuss about necessity of composite masonry wall (L2)
3. Describe about importance of infilled frames (L2)

Text Books:

1. Henry,A.W, "Structural masonry", Macmillan Education Ltd., 1990.
2. Dayarathnam.P, "Brick and reinforced brick structures", Oxford & IBH Publication, 1987.

References:

1. Sinha, B.P and Davies, S.R, "Design of Masonry Structures", E & FN spon, 1997.
2. IS 1905-1987, "Code of practice for structural use of unreinforced masonry", 3rd Revision, BIS, New Delhi.
3. SP 20 (S&T), "Hand book on Masonry Design and Construction", 1st Revision, BIS, New Delhi, 1991.