SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Master of Technology
Structural Engineering

M. Tech. I Semester– II

Subject Name: Design of Masonry Structures **Subject Code:** MTST14203

Type of course: PE III

Prerequisite: Strength of Materials, Structural Analysis, Structural Design (RC or steel), and preferably Seismic design of Structures

Rationale: Students will able to understand properties of masonry units, strength and factors affecting strength,design criteria of various types of wall subjected to different load system,Impart the culture of following the codes for strength, serviceability and durability as an ethics and provide knowledge in analysis and design of masonry elements for the success in competitive examinations.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	2	4	60	25	15	30	20	150

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3**: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

PE-III: Program Elective-III

Content:

Sr. No.	Content	Total Hrs	Module Weightage %
1	**Masonry units, materials, types & 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 anderrors in masonry construction, cracks in masonry, types, reasons forcracking, methods of avoiding cracks.	5	12%
2	**Strength and stability** Strength and stability of concentricallyloaded masonry walls, effect of unit strength, mortar strength, joint thickness,rate of absorption, effect of curing, effect of ageing, workmanship, strengthformulae and mechanism of failure for masonry subjected to directcompression.	5	12%
3	**Permissible stresses** Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses.	5	12%
4	**Design considerations** Effective height of walls and columns,opening in walls, effective length, effective thickness, slenderness ratio,eccentricity, load dispersion, arching action, lintels.	6	12%
5	**Load considerations for masonry** Wall carrying axial load, eccentric load with different eccentricity ratios, walls with openings, freestanding wall.	5	12%
6	**Design of masonry walls** Design of load bearing masonry for building up to 3 storeys using IS: 1905 and SP : 20 procedure.	8	16%

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7	**Application**, flexural and compression elements, shear walls.	5	12**%**
8	**Masonry walls in composite action** Composite wall-beam elements, in filled frames.	5	12**%**

Suggested Specification table with Marks (Theory):

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

Sr no	**Title of book /article**	**Author(s)**	**Publisher and details like ISBN**	**Year of publication**	**Publication Edition**
1.	Design of Masonry structures	A.W.Hendry, B.P.Sinha, and S.R.Davies	Taylor and Francis 2003	2003	1st Edition
2.	Brick and Reinforced Brick Structures	Dayaratnam P,	Oxford & IBH, 1987.	1987	1st Edition
3.	Building and Construction Materials	M. L. Gambhir	McGraw Hill education Pvt. Ltd.	2014	1st Edition
4.	Masonry Design And Detailing by Beall C,	Beall C	McGraw Hill	2012	6thEdition

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Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Able to Explain engineering properties and uses of masonry units, (Cognitive level-U)	20%
CO-2	Understand and Summarize various formulae's for finding compressive strength of masonry units. (Cognitive level-U&R)	20%
CO-3	Able to Explain permissible stresses and design criteria as per IS: 1905 and SP-20. (Cognitive level-U&N)	20%
CO-4	Able to Design different types of masonry walls for different load considerations. (Cognitive level-N&R)	20%
CO-5	Able to understand defects and crack in masonry and its remedial measures. (Cognitive level-U&R)	20%

FOR TUTORIAL SESSION:

List of Practicals:

1. Case study on Significant Masonry Structures of the world, India and Gujarat.
2. Design of Masonry structure based on the syllabus. The design report shall consist of full analytical treatment, design procedure, references and all necessary drawings in the form of neat dimensioned sketches.

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