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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester B.E. - Civil Engineering

Semester End Examination; August - 2023

Alternative Building Materials and Masonry Structures

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Understand significance of Energy in building materials, Environmental issues concerned to building materials, Global warming and construction industry.

CO2: Understand the characteristics of building blocks for walls, Stones and Laterite blocks, Bricks and hollow clay blocks.

CO3: Study the possible causes of defects in masonry, factors affecting strength of masonry, and permissible stresses in masonry.

CO4: Design masonry buildings up to three floors, design of walls subject to both axial and eccentric load as per IS relevant codes.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any Two sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
1 a.	List the major categories of climate in the Indian subcontinent [any four].	2	L1	CO1	PO1,7
b.	Write the chemical reactions taking place in the processing of lime stone for mortars: i) Burning of lime stone and ii) Slaking of quick lime	2	L1	CO2	PO1,7
c.	Define Ferro cement.	2	L1	CO3	PO2,4,7,12
d.	Write any two factors influencing compressive strength of masonry.	2	L1	CO4	PO1,2,3
e.	List any two stress reduction factors.	2	L1	CO4	PO1,2,3
II : PART - B		90			
UNIT - I		18			
2 a.	List out environmental friendly cost effective building materials. Explain in detail.	9	L1	CO1	PO1,7
b.	List and explain briefly the different categories of energy consumption in building materials.	9	L1	CO1	PO1,7
c.	Explain traditional building methods and vernacular architecture.	9	L2	CO1	PO1,7
UNIT - II		18			
3 a.	Elaborate the various step involved in manufacturing of SMB blocks.	9	L1	CO2	PO1,7
b.	List the different types of Industrial wastes and explain their uses in building construction.	9	L1	CO2	PO1,7
c.	Broadly classify the reinforcing materials in Fiber Reinforcing cement Composition (FRC) and explain the properties of fibers to be effective in concrete matrix.	9	L2	CO2	PO1,7
UNIT - III		18			
4 a.	Explain the rammed earth technique giving all the technical details.	9	L2	CO3	PO2,4,7,12

- b. Explain the different types of mesh reinforcement available in the market. Also, sketch the typical cross section of ferro-cement element. 9 L2 CO3 PO2,4,7,12
- c. Explain the concept and details of composite beam and panel roofs. 9 L2 CO3 PO2,4,7,12

UNIT - IV

18

- 5 a. Explain with a neat sketch how the lateral stresses vary in brick masonry prism in relation to the elastic moduli of one brick and the mortar when $E_b < E_m$. 9 L2 CO4 PO1,2,3
- b. What are the factors influencing compressive strength of masonry? Explain any three factors. 9 L2 CO4 PO1,2,3
- c. Define;
 - i) Shape reduction 9 L1 CO4 PO1,2,3
 - ii) Permissible compressive stress
 - iii) Permissible shear stresses

UNIT - V

18

- 6 a. Write the procedure for design of masonry wall under vertical gravity load. 9 L1 CO4 PO1,2,3
- b. Design an interior cross wall of a 2 storeyed building to carry 150 mm thick RCC slab with 3.3 m ceiling height. The wall is unstiffened and it supports 3 m wide slab. Take LL on roof = 1.5 kN/m², LL on floor = 2 kN/m², Weight of 80 mm thick WPC in terrace = 2 kN/m², and a weight of floor finish = 1 kN/m². 9 L5 CO4 PO1,2,3
- c. External wall of a single storeyed house is 200 mm thick and has door and window openings as shown in Fig. 5(c) plinths level is 1.2 above the top of foundation footing and floor to ceiling height is 2.80 m. One way RCC slab of 3 m clear span beams on the wall is 100 mm thick. Determine the maximum stress in the wall and calculate the strength of brick and grade of mortar required for the wall. There is 200 mm thick parapet wall of 0.8 m height above the roof slab wall and parapets are plastered on both sides. 9 L5 CO4 PO1,2,3

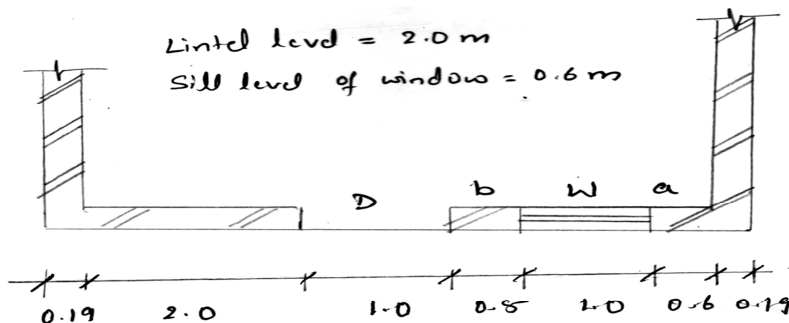


Fig. 5 [C]