USN | | | | | | | | | | | **18CV735**

Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024
Masonry Structures

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
       2. *Use of IS 1905:1987 is permitted.*

Module-1

1 a. Briefly discuss the significant engineering properties of masonry units. **(06 Marks)**
   b. Describe the commonly observed workmanship defects in masonry. **(06 Marks)**
   c. Explain the types and properties of masonry mortars. **(08 Marks)**

OR

2 a. With help of neat sketches, represent the types of crack observed in masonry. **(06 Marks)**
   b. What are the constituents of good quality burnt clay bricks? Discuss the properties imparted by constituent materials. **(06 Marks)**
   c. List the factors influencing performance of masonry. Explain any three factors in detail. **(08 Marks)**

Module-2

3 a. Classify the types of wall and specify the purpose of each. **(08 Marks)**
   b. Describe the effect of arching action in masonry. **(06 Marks)**
   c. Write a short note on permissible tensile and shear stresses in masonry. **(06 Marks)**

OR

4 a. Differentiate working stress, permissible stress and basic compressive stress. **(06 Marks)**
   b. Describe the effect of load dispersion in masonry. **(06 Marks)**
   c. In context of analysis of masonry, discuss the significance of effective height and effective length. **(08 Marks)**

Module-3

5 a. Design an axially loaded unstiffened solid wall of a two storeyed building, carrying 125 mm thick RCC slab of effective span 3.4 m, with 3.2 m ceiling height. Wall is fully restrained at top and bottom. Live load on floor is 2.1 kN/m^2, live load on roof is 1.8 kN/m^2, load of floor finishes 0.2 kN/m^2 and load of terrace coat 1.25 kN/m^2. **(10 Marks)**
   b. Design an interior cavity wall with cross wall for a three storeyed building, ceiling height of each storey is 3.0 m. The wall is stiffened by intersecting wall of 200 mm thickness at 3.5 m centre to centre. Assume loading from roof as 14.25 kN/m and from each floor 17.3 kN/m. **(10 Marks)**

OR

6 a. A solid wall of thickness 300 mm, continuous at ends, is adequately bonded by piers. Height of wall is 3.8 m and distance between centres of pier is 4.6 m. Wall is fully restrained at top and bottom. Width and thickness of pier is 300 mm and 600 mm respectively. Design the wall considering roof load as 40 kN/m. **(10 Marks)**
   b. Design the ground floor wall of a three storeyed building, having clear floor height of 3.2 m, between cross walls of 200 mm thickness. Centre to centre length of wall between cross walls is 3.5 m. Dead load of each floor/roof is 11.25 kN/m. Live load on floor is 2.0 kN/m^2, live load on roof is 1.0 kN/m^2, load of floor finishes 0.4 kN/m^2, load of terrace coat 1.0 kN/m^2. Bricks of size 230 × 105 × 75 mm is available for construction. **(10 Marks)**

Module-4

7 a. Two loads are acting on a masonry wall of 200 mm thickness. An axial load of 12 kN/m and an eccentric load of 25 kN/m at an eccentricity of 75 mm. If the slenderness ratio is 14, what is the brick strength and mortar grade required. Also design masonry considering slenderness ratio of 16. **(12 Marks)**

   b. Explain the procedure and considerations for design of masonry wall with openings. **(08 Marks)**

OR

8 a. Derive and represent the stress distribution in masonry under eccentric loading for eccentricity ratio of $\frac{1}{12}$ and $\frac{1}{3}$. **(08 Marks)**

   b. Design an exterior wall of a workshop building stiffened by piers, with a spacing of 4.5 m centre to centre. Wall is 3.6 m in height and is securely tied at roof and floor level. Wall is carrying steel truss at top. Consider reaction from roof truss at centre of wall as 30 kN and load from roof as 7 kN/m. Consider $t_w = 200$ mm, $w_p = t_p = 400$ mm. **(12 Marks)**

Module-5

9 a. Discuss the behaviour and design criterion of shear wall. **(10 Marks)**

   b. With neat sketch, discuss the significance of reinforced masonry wall, reinforced masonry slab and reinforced masonry lintel. **(10 Marks)**

OR

10 a. Design an exterior wall of a single storey warehouse of 3.5 m height. The loading on wall consists of vertical load of 25 kN/m from roof and wind pressure of 860 kN/m^2. The wall is tied with metal anchor at floor and roof level. **(10 Marks)**

   b. With neat sketch, explain different modes of failures in in-filled frames. **(10 Marks)**

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