CBCS Scheme

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15CV553

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Masonry Structures

Time: 3 hrs. Max. Marks: 80

Note: *1.* **Answer any FIVE full questions, choosing ONE full question from each module.**
2. Use of IS – 1905 – 1987 code of practice for structural use of un reinforced masonry is permitted.

Module-1

1 a. Explain in brief various field and laboratory tests conducted on bricks. **(08 Marks)**

b. Briefly explain the factors effecting compressive strength of masonry. **(08 Marks)**

OR

2 a. Derive the expression for compressive strength of masonry based on elastic theory. **(08 Marks)**

b. With neat sketches briefly explain causes and remedial measures for cracks in masonry. **(08 Marks)**

Module-2

3 a. Explain the following terms with suitable values :
i) Permissible compressive stress
ii) Stress reduction factor
iii) Permissible tensile stress
iv) Permissible shear stress **(08 Marks)**

b. Explain with values of the following :
i) Effective thickness
ii) Effective height. **(04 Marks)**

c. A solid wall of thickness 200mm is 3m in height and 5m in length. The wall is fully restrained laterally and rotationally at top and bottom. No openings in the wall. Determine the effective thickness, effective height, effective length and slenderness ratio. **(04 Marks)**

OR

4 a. With neat sketches list different types of walls. **(08 Marks)**

b. Explain the arch action in lintels **(04 Marks)**

c. A solid wall with thickness 300mm is adequately bounded by piers as shown on Fig.4(c). The height of wall is 4m and length is 5m. The wall is fully restrained at top and bottom and no openings. Determine the stiffening co-efficient, effective thickness, effective height, effective length and slenderness ratio. **(04 Marks)**

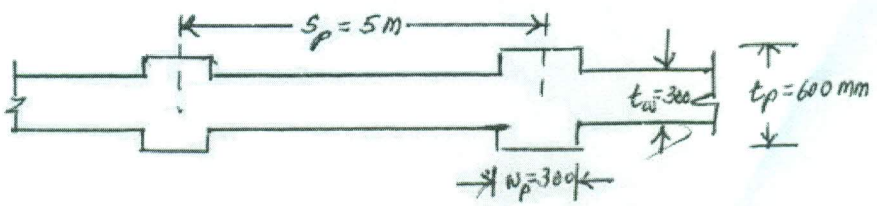

Fig.Q4(c)

Module-3

5 a. List the steps involved in the design of axially loaded walls without eccentricity. **(04 Marks)**

b. Design an axially loaded interior solid cross-wall of a two storeyed building to carry 100mm thick RCC slabs with 3m ceiling height. The wall is fully restrained at top and bottom. The wall supports a 2.65m wide slab.
Live load on roof = 1.5 kN/m^2 ; live load on floor = 2.0 kN/m^2; weight of 80mm thick time terrace = 1.96 kN/m^2; weight of floor finish = 0.2 kN/m^2. Refer Fig.Q5(b). **(12 Marks)**

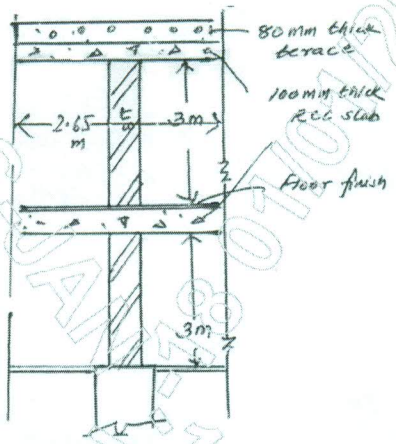

Fig.Q5(b)

OR

6 Design an interior cavity wall with cross-walls for a three storeyed building, the ceiling height of each storey being 3m. The wall is stiffened by intersecting walls 200mm thick at 3600mm centre to centre. Assume loading from roof = 16 kN/m and from each floor = 12.5 kN/m. Refer Fig.Q6 given below. **(16 Marks)**

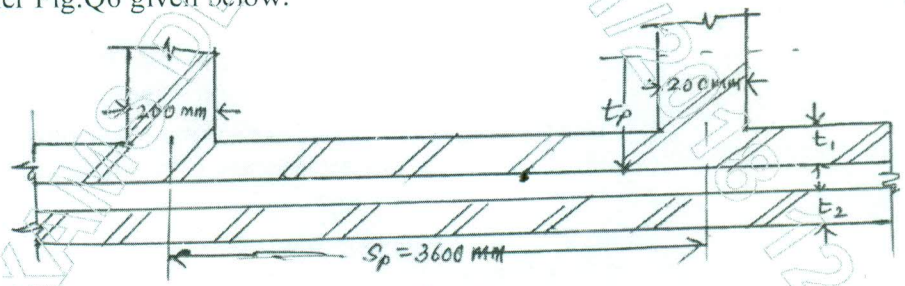

Fig.Q6

Module-4

7 a. Design neat sketches briefly explain stress distribution for various eccentricition :
i) e = 0 ii) 0 < e < t/6 iii) e = t/6 iv) e > e/6. **(04 Marks)**

b. Design a solid wall with piers under a concentrated load for a workshop building 3.6m high carrying steel trusses at the top at 4.5m spacing. The wall is fully restrained at top and bottom. The loading shall be assumed as follows :
Concentrated reaction from the roof trusses = 30kN acting at the centre of wall
Roof loading = 7 kN/m
Wind load may be neglected. **(12 Marks)**

OR

8 a. Explain the design criteria of walls subjected to concentrated load. **(04 Marks)**

b. Design an interior cross wall(AB) under eccentric loading for a single storyed building, supporting unequal concrete roof slab. The plan is shown in Fig.8(b). Assume triangular bearing pressure and roof loading as 10 kN/m^2. The storey height is 3.8m and the wall is fixed to foundation block below. **(12 Marks)**

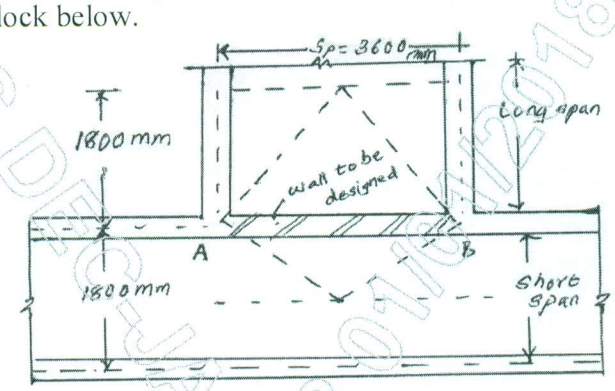

Fig. Q8(b)

Module-5

9 a. With neat sketches, explain modes of failure of infilled frames. **(06 Marks)**

b. Design a shear wall under seismic loading, length of wall 4.5m and 3m high to resist a horizontal earthquake force in its plane. Assume seismic load to be uniformly distributed across the height of the wall. Earthquake acceleration = 0.1g. The wall is tied with metal anchors at the top and bottom supports both top and bottom are partially restrained. **(10 Marks)**

OR

10 a. Mention various stability checks in the design of masonry retaining walls and briefly explain them. **(04 Marks)**

b. Design a compound wall, the height of which, is 1.8m up to the top of coping. Assume wind pressure equal to 1000N/m^2 and is uniformly applicable. The safe bearing pressure on the soil is 120 kN/m^2. Hard bed is available at a depth of 900mm below ground level. Refer below Fig.Q10(b). **(12 Marks)**

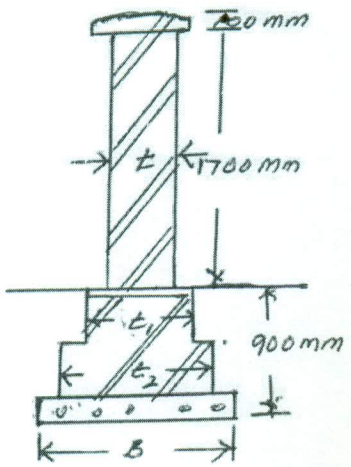

Fig.Q10(b)

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