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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Second Semester, M. Tech - Civil Engineering (MCAD)
Semester End Examination; June - 2016
Seismic Resistant Design of Structural Systems

Time: 3 hrs   *Max. Marks: 100*

Note: i) *Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
   ii) *Assume missing data if any.*
   iii) *Use of IS 1893-2002 is permitted with other relevant IS codes.*
   iv) *Answer for descriptions may be answered using sketches whenever possible.*

UNIT - I

1 a. What is meant by the focus and epicenter of an earthquake? Name the two kinds of body waves and explain how they differ?   10

  b. Discuss the theory of plate tectonics. Mention various plate boundaries and their behaviour.   10

2 a. How do you distinguish between magnitude and intensity of an Earthquake? What is Richter Scale?   10

  b. What is liquefaction? What are the remedial measures to overcome the problems of liquefaction on an earthquake?   10

UNIT - II

3 a. What is response spectrum? How are design response spectrum developed?   10

  b. Explain how buildings twist during an earthquake?   10

4. For the four storied RCC office building located in Zone V resting on hard rock. Compute the Seismic forces as per IS-1983-2002. Height of first storey is 4.2 m and the remaining three stories are of height 3.2 m each. Plan dimensions length and width of the structure arc 15 m x 20 m. The RCC fames arc is filled with brick masonry.

  Dead load on floor =12 kN/m^2 and on roof 10 kN/m^2

  Live load on floor = 4 kN/m^2 and on roof 1.5 kN/m^2.

  Compute the base shear, neglecting the stiffness of infill walls. Compare the base shear for the two cases with and without infill walls.   20

UNIT - III

5 a. Discuss the architectural considerations in planning and design of earthquake resistant structures.   10

  b. What is soft storey effect? Explain.   10

6 a. Why short column is more acceptable to earthquake force than a long column?   10

  b. Explain in detail with sketches the ductile detaining provision for flexural members.   10

UNIT - IV

7 a. Why are horizontal bonds necessary in Masonry buildings?   10

   b. What is a shear wall? Explain its advantages and why shear walls are preferred in seismic regions.   10

8 a. Define Masonry buildings. What materials are generally used in Masonry construction? What are the reasons for their poor performance under seismic excitation?   10

   b. Plan and Elevation of a 3 storey RCC school building is shown in Fig. 8(b). The building is in Zone V. The type of soil encountered is medium and it is proposed to design the building with SFRM. The intensity of the total dead load is 10 kN/m^2 on each floor and the floors are to be designed to cater an additional imposed load of 3 kN/m^2. Determine earthquake load on the structure.   10

Fig 8(b).
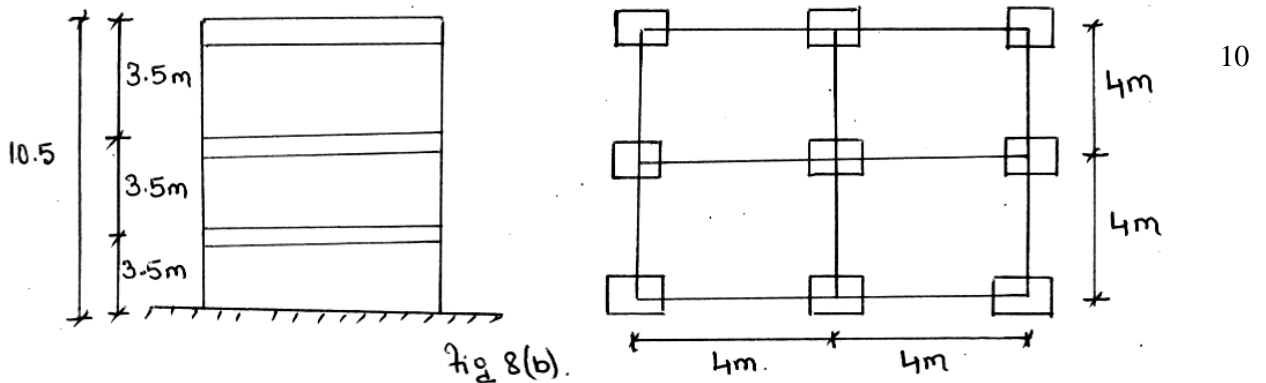
UNIT - V

9 a. Define base isolation and what are the principles involved in Seismic base isolation of buildings?   10

   b. List the guidelines to be followed in earthquake resistance design of structures.   10

10 a. Explain different strategies adopted for Seismic retrofitting of R.C. buildings.   10

   b. Determine the lateral forces on a two storey unreinforced brick masonry building as shown in Fig. 10(b) situated brick masonry in Zone II for the following data,   10

Plan size 18x8 mts
Total height of building 6.2m
Storey height 3.1m
Weight of roof 2.5 kN/m²
Weight of wall 5.0 kN/m².

fig 10 (b)

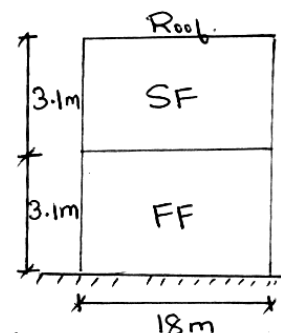* * * *