



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

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, M. Tech - Civil Engineering (MCAD)

Semester End Examination; May/June - 2018

Seismic Resistant Design of Structural System

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.

ii) Use of IS1893-2002 is permitted. iii) Missing data, if any, may suitably assume.

UNIT - I

- | | |
|-------------------------------------------------------------------------------------------------------------------------------|----|
| 1 a. With neat sketches, explain the different types of waves generated during earthquakes and mention their characteristics. | 12 |
| b. Explain plate tectonic theory and elastic rebound theory with respect to occurrence of earthquake. | 8 |
| 2 a. What is Microzonation? Mention the main components of Microzonation. What is the usefulness of it? | 10 |
| b. Explain the seismic zonation map of the country and what is its usefulness in design? | 10 |

UNIT - II

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 3 a. What are response spectrum charts and explain its significance in earthquake engineering? | 10 |
| b. What is ductility? Explain its importance in earthquake engineering. | 10 |
| 4 a. Explain the design response spectrum used in earthquake resistant design of structures. | 6 |
| b. A five storey hospital building is proposed to be constructed in Delhi with the following details : | |
| The columns are of size 300 x 300 mm spaced at 6 m c/c in both direction with overall size of the building 30 m x 30 m. Beam of section 300 x 450 mm are provided continuously on all columns in both directions. Assume 230 mm wall only on the outer Pheriphery of the building. Assume the slab 150 mm thick in all floors, LL on roof is 1.5 kN/m ² and on floors is 4 kN/m ² . Height of each floor is 3.5 m. Assume the soil to be soft and frames as MRF. Compute the base shear and distribution of forces on each floor. | 14 |

UNIT - III

- | | |
|--------------------------------------------------------------------------------------------------------------|----|
| 5 a. Explain the Phylosophy of earthquake resistance design. | 8 |
| b. What are the vertical irregularities with respect to earthquake resistance design? Explain with sketches. | 12 |
| 6 a. How building twist during earthquakes? What precautions are necessary to avoid such twists? | 10 |
| b. Explain the behavior of rigid and flexible structures during earthquakes. | 10 |

UNIT - IV

- 7 a. Explain the behavior of masonry buildings during earthquakes. 10
- b. List the lessons learnt from the failure of masonry building during post earthquakes. 10
- 8 a. Explain the different measures to be adopted during construction at earthquake resistant masonry building. 10
- b. Explain the behavior of infilled walls in R.C. frames and how the infill effect is considered in the analysis? 10

UNIT - V

- 9 a. What is liquefaction? Explain the factors influencing liquefaction. 10
- b. How torsion effect is considered on seismic analysis of R.C. structures as per IS codal provisions? 10
- 10. Explain the following with respect to earthquake resistance design :
 - a) Base Isolation devices
 - b) Energy classification devices 20
 - c) Properties of Construction materials
 - d) Load combinations in seismic analysis

* * * *