



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; June - 2017

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) Assume missing data if any.

iii) Use of IS 1893-2002 is permitted with other relevant IS codes.

UNIT - I

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|------|---|----|
| 1 a. | Explain with sketches the different types of waves generated during earthquakes and mentioning their characteristics. | 12 |
| b. | Distinguish between magnitude and intensity of earthquake. | 8 |
| 2 a. | With neat sketch, explain a typical earthquake ground motion. Discuss the characteristics of earthquake ground motion that is necessary for design. | 10 |
| b. | Explain the functions of seismogram and accelergram. | 10 |

UNIT - II

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|------|---|----|
| 3 a. | What is response spectrum chart? Explain the design response spectrum chart used in earthquake resistant design of structures. | 10 |
| b. | What is ductility and how it is measured? Discuss the factors influencing ductility. | 10 |
| 4 a. | How architectural features affect R.C. buildings during earthquake? | 10 |
| b. | Explain soft storey and extreme soft storey. Explain the provisions of IS-1893 for the analysis and design of buildings with soft storey. | 10 |

UNIT - III

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|------|---|----|
| 5 a. | Mention the difference between equivalent static procedure and dynamic analysis. | 8 |
| b. | A 5 storey special moment resisting R.C. frame building is proposed to be constructed in Delhi for a hospital. The height of each floor is 3.5 m and span at the frame is 6 m. The total dead and imposed load which are lumped at each floor and roof level are 300 kN and 250 kN respectively. The soil below the foundation levels is assumed to be hard rock. Calculate the total base shear and plot the distribution of base shear along the height of the floor. | 12 |
| 6 a. | Explain the guidelines to be followed in earthquake resistant design philosophy. | 8 |
| b. | Explain the following with respect to earthquake resistant design : | |
| i) | String column and weak beam concept | 12 |
| ii) | Short column effect. | |

UNIT - IV

- 7 a. What are different structural systems used for earthquake resistant construction? Explain with neat sketches. 10
- b. List and explain the geotechnical aspects at earthquake effects. 10
- 8 a. List the lessons learnt from the failure of masonry buildings during past earthquakes. 10
- b. Explain the behavior of infilled walls in R.C. frames and how are they analyzed? 10

UNIT - V

- 9 a. Explain various measures of improving the earthquake resistance of masonry buildings with neat sketches. 12
- b. Explain the various load combinations used for seismic analysis of R.C. buildings. 8
10. Explain the following with respect to earthquake resistant design and construction :
- | | | |
|-------------------------|-------------------------------|----|
| i) Base isolation | ii) Torsion in buildings | 20 |
| iii) Seismic zoning map | iv) Behaviour of shear walls. | |

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