



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

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Civil Engineering

Semester End Examination; July / Aug. - 2022

Earthquake Resistant Design of Structures

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Understand the basic knowledge of earthquakes and its relation to structural systems.

CO2: Apply the knowledge of engineer conception and design of structural systems against earthquakes.

CO3: Analyze the design of reinforcement concrete structural systems subjected to earthquake forces.

CO4: Summarize the retrofitting of RC and Masonry structures.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any Two sub questions (from a, b, c) for Maximum of 18 marks from each unit.

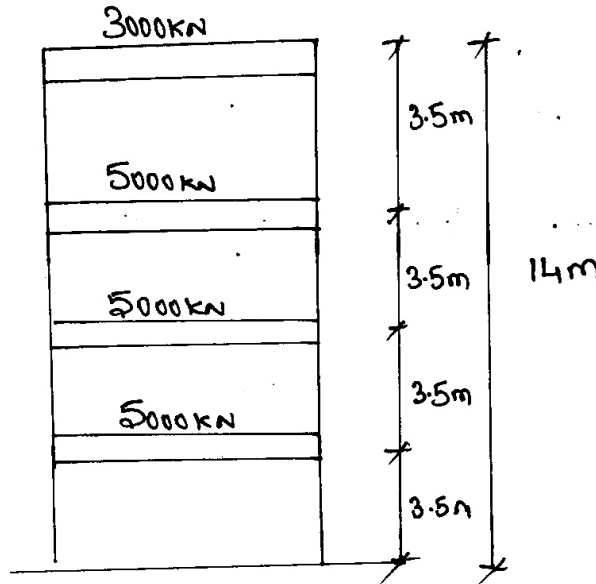
III) IS-1893 Part-I (2016) is permitted, Assume any missing data.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
I a.	What is an earthquake? What causes earthquakes?	2	L1	CO1	PO1,2
b.	What should be configuration of an earthquake resistant building? What are the specifications of an earthquake building?	2	L1	CO3	PO1,2
c.	What are the objectives of earthquake resistant design of reinforced concrete?	2	L1	CO3	PO1,2
d.	What is ductility ratio?	2	L1	CO3	PO2,3
e.	What are the types of base isolation?	2	L1	CO4	PO1,4
II : PART - B		90			
UNIT - I		18			
1 a.	What is meant by focus and epicenter of an earthquake? Name and explain two kinds of body waves.	9	L2	CO2	PO1,3
b.	How do you distinguish between the magnitude and intensity of an earthquake? What is Richter scale?	9	L2	CO2	PO1,3
c.	Explain elastic rebound theory as applied to earthquakes.	9	L2	CO1	PO1,2
UNIT - II		18			
2 a.	Explain different types of irregularities affecting the performance of structure during an earthquake?	9	L2	CO2	PO1,3
b.	How to reduce earthquake effects on buildings?	9	L2	CO3	PO2,3
c.	What are the lessons learnt from the past earthquakes? What are the Do's and Dont's before and during earthquake?	9	L2	CO2	PO1,3

UNIT - III

18

- 3 a. A four storey R.C SMRF framed building is situated in zone-4. The height between floors is 3.5m and total height of the building is 14m. The dead load lumped at respective floors. The soil below the foundation is assumed to be on hard rock. The building is intended to use as hospital. Determine total base shear by equivalent method as per IS 1893. Also distribute base shear along the height of the building.



9 L3 CO3 PO2,3

fig 3(a)

- b. List the guidelines to be followed in earthquake resistant design of structures.
- c. Explain failure mechanism in infilled frame?

9 L3 CO3 PO1,3

9 L3 CO3 PO1,3

UNIT - IV

18

- 4 a. Explain in detail with sketches, the ductile detailing provision for flexural members.
- b. How to make buildings ductile for good systemic performance.
- c. Define Liquefaction. Explain the types and effects of liquefaction.

9 L2 CO2 PO2,3

9 L3 CO3 PO2,3

9 L1,2 CO4 PO1,4

UNIT - V

18

- 5 a. Define base isolation and what are the principles involved in seismic base isolation of buildings.
- b. Explain different strategies adopted for seismic retrofitting of RCC buildings.
- c. How to make stone masonry building earthquake resistant.

9 L1,2 CO4 PO1,4

9 L2 CO4 PO1,4

9 L3 CO3 PO2,3