



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; October - 2023

Seismic Resistant Design of Structures

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Understand and Identify the theories responsible for occurrence of earthquakes, consequences and necessity of seismic zoning.

CO2: Analyze and Use the response spectrum principle in the earthquake resistant design of structures.

CO3: Ability to apply the knowledge of engineering to conceptually design of structural systems against earthquakes.

CO4: Ability to analyze and design of reinforced concrete structural systems subjected to earthquake forces and Summarize the seismic evaluation and retrofitting of 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 a Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
1 a.	What is Magnitude and Intensity of earthquake?	2	L1	CO1	PO1,2,3,4
b.	List the characteristics of response spectrum.	2	L1	CO2	PO1,2,3,4
c.	Define soft storey.	2	L1	CO3	PO1,2,3,4
d.	Define forced vibration and free vibration.	2	L1	CO3	PO1,2,3,4
e.	What is ductile detailing?	2	L1	CO4	PO1,2,3,4
II : PART - B		90			
UNIT - I		18			
2 a.	Explain with sketches the different types of waves generated during earthquakes and mention their characteristics.	9	L2	CO1	PO1,2,3,4
b.	List and explain the seismic measuring instruments.	9	L2	CO1	PO1,2,3,4
c.	Briefly explain plate tectonic theory with neat sketch.	9	L2	CO1	PO1,2,3,4
UNIT - II		18			
3 a.	A four storied OMRF building without brick infill panel proposed to be constructed in an area of earthquake zone III is proposed for a commercial building. All the single bay portal frames are of span 7.5 m and height of each floor being 3 m. The total lumped mass at all the floors is 13650 kN while that at roof level is 2800 kN. Soil below the foundation is medium soil. Calculate the total base shear and plot the distribution of base shear along the height of the floor.	18	L4	CO2	PO1,2,3,4
b.	Briefly explain the concept of response spectrum method. Also, explain design response spectrum chart used in earthquake resistant design of structures.	18	L2	CO2	PO1,2,3,4

UNIT - III		18
4 a.	Explain the provision of IS-1893 for the analysis and design of buildings with soft storey.	9 L2 CO3 PO1,2,3,4
b.	List and explain the types of irregularities affecting the performance of the structure during an earthquake.	9 L2 CO3 PO1,2,3,4
c.	Briefly explain the behavior of structure for gravity load and seismic load.	9 L2 CO3 PO1,2,3,4
UNIT - IV		18
5 a.	List and explain the lateral load resisting system with neat sketches.	9 L2 CO4 PO1,2,3,4
b.	Mention the lessons learnt from the failure of masonry buildings during past earthquakes.	9 L2 CO4 PO1,2,3,4
c.	Briefly explain the necessity of providing bands in masonry structures.	9 L2 CO4 PO1,2,3,4
UNIT - V		18
6 a.	Briefly explain the codal provisions made in the ductile detailing of compression members designed for earthquake resistant design.	9 L2 CO4 PO1,2,3,4
b.	What is base isolation? Explain the necessity of providing seismic base isolation in buildings.	9 L1 CO4 PO1,2,3,4
c.	Briefly explain the codal provisions for seismic retrofitting of RC buildings.	9 L2 CO4 PO1,2,3,4

* * * *