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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 - 2021

Seismic Resistant Design of Structures

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Predict the source of earthquakes understanding seismology and conceptually design the building.

CO2: Apply the Response Spectrum Analysis Method and static equivalent method for the determination of lateral loads on the buildings.

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

CO4: Apply ductility requirements for the design of structural components and summarize the seismic evaluation and retrofitting of structures.

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

II) *Any* ***THREE*** *units will have internal choice and remaining* ***TWO*** *unit questions are compulsory.*

III) *Each unit carries 20 marks. Use of IS1893-2016 is permitted, missing data if any may be suitably assume.*

Q. No.	Questions	Marks	BLs	COs	POs
	UNIT - I	**20**			
1 a.	Mention the differences between; i) Seismograph and Seismogram ii) Magnitude and intensity of earthquake	10	L1	CO1	PO1,2
b.	Explain with sketches, the different types of waves generated during earthquake.	10	L2	CO1	PO1,2
	OR				
1 d.	Explain plate tectonic theory and elastic rebound theory with respect to occurrence of earthquake.	10	L2	CO1	PO1,2
e.	Explain Seismic Zonation map of the county and what is its' usefulness in design.	10	L2	CO1	PO1,2
	UNIT - II	**20**			
2 a.	What is ductility? Explain its importance in earthquake engineering.	10	L1	CO2	PO1,2
b.	What are plan irregularities with respect to earthquake resistant design? Explain with sketches.	10	L1	CO2	PO1,2
	OR				
2 d.	Explain the concept and development of response spectrum.	10	L2	CO2	PO1,2
e.	Explain the various load combinations used for seismic analysis of R.C buildings.	10	L2	CO2	PO1,2

UNIT - III **20**

3. Determine the base shear and distributing of lateral force on each floor for the plan of the building shown in Fig. 3(a).
The building is for hospital with 5 storey's and height of each floor is 3.5 m. Assume live load of 3.5 kN/m^2, columns 450 × 450 mm, beams 300 × 450 mm and slab 150 mm thick. Assume 230 mm thick masonry wall on all beams. Consider the soil to be hard rock and frame to be special moment resisting frame. Location of the building is in Bengaluru.

20 L4 CO3 PO1,3

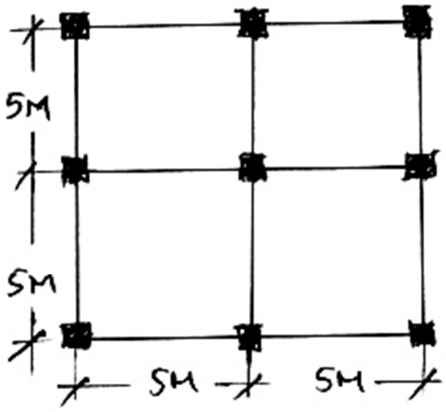

Fig 3(a)

UNIT - IV **20**

4 a. Explain the various measures of improving the earthquake resistance of masonry building with sketches. 10 L2 CO4 PO1,3,4

b. List and explain geotechnical aspects of earthquake on structures. 10 L1 CO4 PO1,3,4

OR

4 d. Explain the behaviors of masonry structures during earthquake. 10 L2 CO4 PO1,3,4

e. List the lessons learnt from the failure of masonry building during post-earthquake. 10 L1 CO4 PO1,3,4

UNIT - V **20**

5 a. Explain different strategies adopted for seismic retrofitting of R.C building. 10 L2 CO4 PO1,3,4

b. Explain the different lateral load resisting systems in building with neat sketches. 10 L2 CO4 PO1,3,4

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