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B.M.S. College of Engineering, Bengaluru-560019

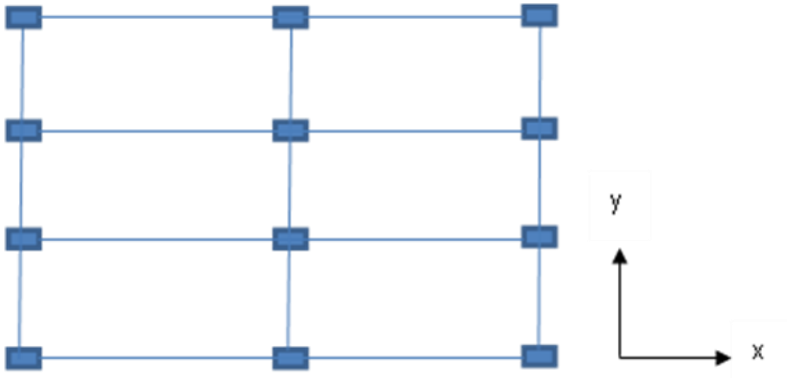
Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VIII**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 21CV8PEERD **Max Marks: 100**
Course: Earthquake Resistant Design of Structures **Date: 08.07.2023**

Instructions: Answer 5 full questions choosing one from each unit.
Missing data may be assumed appropriately and mentioned
Use of IS 1893 (2016), IS 4326 (1993), IS 13920 (1993), IS 13828 (1993) is permitted

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	List the type of plate boundaries and sketch the type of relative motion that occurs dominantly in them.	*CO1*	*PO1*	**06**
	b)	Explain using sketch the steps involved in locating the epicenter.	*CO1*	*PO1*	**08**
	c)	List any four ground motion parameters. Use sketches if necessary.			**06**
		UNIT - II			
2	a)	What is a response spectrum? How is it is constructed? What is the difference between actual response spectrum and design response spectrum?	*CO2*	*PO1*	**12**
	b)	Explain the key aspects of 'seismic design philosophy'. What are the limit states associated with them?	*CO2*	*PO1*	**08**
		UNIT - III			
3		A G+4 storeyed SMRF building consists of plane frames RC columns spaced at 5.0m c/c and 3.0m c/c along x-direction and y-direction respectively (as shown in Fig-Q3). Obtain the distribution of base shear along the height of the building using IS 1893 (2016), **along x-axis for a typical interior frame**. Plot the same. Missing data may be assumed suitably and mentioned.  **Fig Q3: Plan of SMRF building**	*CO3*	*PO3*	**20**

			OR			
	4		A 2-bay, G+5 storeyed RC framed building has to be designed for seismic forces. Obtain the seismic forces at each storey. Plot the shear force and bending moment diagram for a typical interior bay of the building. The following is the data provided; (i) Seismic zone: IV (ii) GF Floor height: 4.2m, remaining floors: 3.0m (iii) Peripheral beams are provided with structurally non-participating 200mm thick in-fill masonry, while the remaining beams are loaded with 100mm thick in-fill walls. Unit weight of masonry: 18.0kN/m^3, (iv) RC slab: 150mm thick, unit weight 25.0kN/m^3 (v) Floor finish load and partition wall loads: 2.0 kN/m^2 (vi) Live load: 3.5 kN/m^2 (vii) Type of soil: silt of high compressibility (MH) with n-value <10) (viii) Take span along X direction and Y direction as 5m and 3m respectively	*CO3*	*PO3*	**20**
			UNIT - IV			
	5		Explain with sketches and their performance in the event of an earthquake. i) Soft storey and Weak Storey ii) Vertical and Horizontal Irregularity iii) Mass Irregularity iv) Open Ground Storey	*CO3*	*PO1*	**20**
			OR			
	6	a)	List the factors that influence the response of a structure during an earthquake	*CO3*	*PO1*	**06**
		b)	With the help of sketches, define/explain (i) ductility (ii) stiffness (iii) strength and (iv) energy dissipation capacity	*CO3*	*PO1*	**08**
		c)	List six ways by which curvature ductility can be increased in RC flexure member	*CO3*	*PO1*	**06**
			UNIT - V			
	7	a)	List any seven types of failures that are generally observed in masonry buildings	*CO4*	*PO1*	**14**
		b)	Sketch any two ways of introduction of (i) horizontal and (ii) vertical reinforcement in masonry	*CO3*	*PO1*	**06**

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