Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3160621 Date:17-12-2022

Subject Name:Earthquake Engineering

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**
5. **Use of IS 1893 and IS 13920 is permitted.**

			Marks
Q.1	**(a)**	What are the known causes of earthquake?	**03**
	(b)	Enlist various IS codes applicable to earthquake engineering.	**04**
	(c)	Elaborate on the seismic waves developed during earthquake and its effects on structure.	**07**
Q.2	**(a)**	Differentiate between static loading and dynamic loading.	**03**
	(b)	Write short note on mathematical modeling.	**04**
	(c)	Derive the motion equation for the free damped vibration.	**07**
		OR	
	(c)	A SDOF vibrating system is consisting of a mass = 160 kg, spring stiffness = 160 N/m, and c = 30 N-sec/m. determine (i) Natural frequency of damped vibration (ii) Damping ratio (iii) logarithmic decrement (iv) Ratio of two successive amplitudes.	**07**
Q.3	**(a)**	Differentiate the following terms 1. Storey drift and storey shear 2. Importance factor and response reduction factor	**03**
	(b)	Give details of expected damages by Earthquake in structures with 1. Short columns, 2. Building frames without shear panels, 3. Floating columns, 4. Unsymmetrical plan	**04**
	(c)	List the four virtues of good earthquake resistance design and describe in detail.	**07**
		OR	
Q.3	**(a)**	Write zone factor [Z] values as per IS 1893-part I.	**03**
	(b)	Explain soft storey & discuss its performance of soft storey building in past earthquakes. How will you avoid soft storey?	**04**

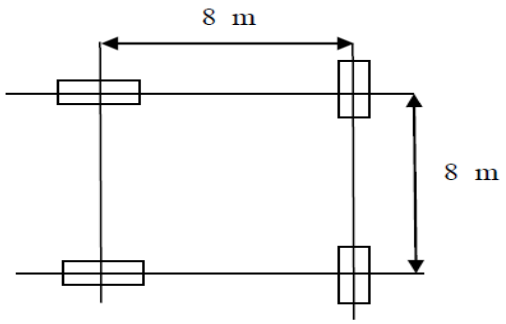
	(c)	Explain the step wise procedure to find the base shear of multistory building with seismic coefficient method with codal provisions.	**07**
Q.4	**(a)**	List assumptions made in Cantilever method of lateral load analysis.	**03**
	(b)	How torsionally couple system is differing from torsionally uncouple system? Discuss it with neat sketches.	**04**
	(c)	Discuss in detail the concepts of the ductile detailing in Beams as per IS: 13920. Write clear codal provisions.	**07**

OR

Q.4	**(a)**	Explain repair, restoration and retrofitting.	**03**
	(b)	Describe importance of shear wall in multistoried Buildings	**04**
	(c)	Explain Earthquake Resistant Design Philosophy. Differentiate between Earthquake Proof Design and Earthquake Resistant Design.	**07**
Q.5	**(a)**	Explain how ductile design is helpful for better earthquake resistance.	**03**
	(b)	Define following (1) Magnitude of Earthquake (2) Intensity (3) Focus (4) Epicenter	**04**
	(c)	Explain the concept of base isolation. Discuss its suitability.	**07**

OR

Q.5	**(a)**	Enlist required conditions for liquefaction. Also suggest remedial measures for the same.	**03**
	(b)	Explain with neat sketches the techniques of Column Jacketing.	**04**
	(c)	Locate the center of mass and center of stiffness for the Fig-1. All column sizes are 350 mm x 650 mm.	**07**



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