Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (Old) EXAMINATION – WINTER 2019

Subject Code: 160605 **Date: 06/12/2019**

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. **IS 13920, IS 1893 and IS 4326 are permitted.**

Q.1	**(a)**	Define following terms: (1) Natural Frequency (2) Vibration (3) Resonance (4) Oscillation (5) Damping (6) Static Load (7) Dynamic Magnification Factor	**07**
	(b)	Write short note on Logarithmic Decrement.	**07**
Q.2	**(a)**	Derive the equation of undamped free vibration of single degree of freedom system.	**07**
	(b)	A spring mass model consists of 5 kg mass and spring of stiffness 5 N/mm was tested for viscous damped vibration. The test recorded two consecutive amplitude is 1.0 cm and 0.85 cm respectively. Determine (i) Natural frequency of un-damped system (ii) Logarithmic decrement (iii) Damping ratio (iv) Damping coefficient (v) Damped natural frequency of system.	**07**
		OR	
	(b)	A vertical cantilever of mild steel tube section is 2.5 m long and supports 5.0 kN weight at top. The tube has 250 mm external diameter and 5 mm wall thickness. The system is subjected to a horizontal harmonic force of 1.0 kN amplitude and 4 Hz frequency at top. Find the maximum steady state displacement and bending stress in the tube. Take damping 5% of the critical.	**07**
Q.3	**(a)**	Define degree of freedom. Explain in detail the types of degree of freedom with example and sketch.	**07**
	(b)	Write short note on liquefaction. Explain factors affecting liquefaction.	**07**
		OR	
Q.3	**(a)**	Enlist the different methods of structural control and explain any one in detail.	**07**
	(b)	Define ductility. Explain the importance of ductility and types of ductility.	**07**
Q.4	**(a)**	Explain various bands and vertical reinforcements for earthquake resistant masonry structures.	**07**
	(b)	Define following terms: (1) Focus (2) Epicenter (3) Aftershock (4) Accelerometer (5) Focal Depth (6) Seismic Zone (7) Seismograph	**07**
		OR	
Q.4	**(a)**	Write a short note on seismic waves.	**07**
	(b)	Explain elastic rebound theory in detail.	**07**
Q.5	**(a)**	Explain the Rigid Diaphragm Effect with sketch.	**07**
	(b)	Explain four virtues of earthquake resistant design.	**07**
		OR	
Q.5	**(a)**	Explain the effect of irregularities on performance of RC Buildings with sketch.	**07**
	(b)	Explain the step wise procedure to find the base shear of multi-storey building with seismic coefficient method with codal provisions.	**07**

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