

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021****Subject Code:3160621****Date:04/12/2021****Subject Name:Earthquake Engineering****Time:10:30 AM TO 01:00 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 – 2002 and IS 13920 – 1993 is permitted.

		MARKS
Q.1	(a) Define (i) Damping (ii) Focus (iii) Epicenter	03
	(b) (i) Differentiate between magnitude and intensity. (ii) State whether following statements are true or false. If false write correct statement. (a) Over damped system comes to rest, faster than critically damped system. (b) Compression waves are also known as Rayleigh waves.	04
	(c) Explain four virtues of earthquake resistant design.	07
Q.2	(a) Define tectonic plates. Discuss plate tectonic theory.	03
	(b) Differentiate between inter plate and intra plate earthquake	04
	(c) Write the equation of motion for damped free vibration and derive the expressions for the displacement.	07
OR		
	(c) A SDOF vibrating system is consisting of a mass = 150 kg, spring stiffness = 150 N/m, and $c = 40$ 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) Name the major plates of the earth.	03
	(b) Discuss the strong column – weak beam concept.	04
	(c) Explain importance of various bands in masonry buildings?	07
OR		
Q.3	(a) Enlist and explain in details the factors that affect the natural time period / natural frequency of a structure.	03
	(b) Explain Time History Analysis method.	04
	(c) A three storeyed building has a size of 20 m x 20 m. it is located in Bhuj and resting on hard soil. The weight of each floors are 2000 kN, 2100 kN, 2500 kN respectively. The height of floors is 3 m, 3 m and 3m respectively.	07

Assuming the building as special moment resisting office building, calculate the horizontal shear force by seismic coefficient method.

- Q.4** (a) List assumptions made in Portal frame method of lateral load analysis. **03**
(b) Distinguish between centre of mass and centre of stiffness. **04**
(c) Explain 'rigid diaphragm' and 'Flexible diaphragm'. **07**

OR

- Q.4** (a) Give assumptions made in cantilever method of lateral load analysis. **03**
(b) How design eccentricity is calculated as per IS: 1893 (1) -2002? **04**
(c) Discuss the expected damages by Earthquake in structures having **07**
i) Unsymmetrical plan ii) Floating columns iii) Soft storey iv)
Building frames without shear panels v) Short Column.

- Q.5** (a) Enlist requirements of shear wall as per IS 13920-2016. **03**
(b) Explain soil liquefaction in detail. **04**
(c) Discuss the capacity design concept in ductile detailing. **07**

OR

- Q.5** (a) Explain crack repair by grouting. **03**
(b) What is base isolation? Discuss briefly about base isolation. **04**
(c) Discuss in detail the concepts of the ductile detailing in Beams as per IS: 13920-2016. **07**
