

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019****Subject Code: 2170612****Date: 23/11/2019****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. Use of IS 1893 – 2002 and IS 13920 – 1993 is permitted.

- Q.1** (a) Differentiate between magnitude and intensity **03**
 (b) Describe seismic waves briefly. **04**
 (c) Define liquefaction and explain the causes and remedial measures of liquefaction. **07**
- Q.2** (a) Define and explain pounding effect **03**
 (b) Explain Time History Analysis method **04**
 (c) Explain importance of various bands in masonry buildings? **07**
- OR**
- (c) Find the natural frequency of the system shown in the fig.1. **07**
- Q.3** (a) Define the terms – 1. Focus 2. Base shear 3. Magnitude of Earthquake **03**
 (b) Describe importance of shear wall in multistoried Buildings **04**
 (c) Explain ductile detailings of Beam as per IS 13920 **07**
- OR**
- Q.3** (a) Differentiate between inter plate and intra plate earthquake **03**
 (b) Elaborate elastic rebound theory **04**
 (c) Describe base isolation technique **07**
- Q.4** (a) Explain PGA. **03**
 (b) Describe the codal provisions for vertical reinforcement in masonry walls **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
- OR**
- Q.4** (a) List assumptions made in Portal frame method of lateral load analysis **03**
 (b) Briefly explain four virtues of earthquake resistant design **04**
 (c) A spring mass model consisting of 9 kg mass and a spring having stiffness 3.6 N/mm was tested for viscous damped vibration and the test record showed two successive amplitudes as 1.75 and 1.5. Determine **07**
 1. Natural frequency of Undamped System 2. Logarithmic Decrement
 3. Damping ratio 4. Damping coefficient and 5. Damped natural period
- Q.5** (a) A three story building frame with uniform floor height of 4m is having lumped masses of 8 tonnes, 6 tonnes and 4 tonnes at first, second and third floor respectively with uniform storey stiffness of 1000 kN/m at each floor. Calculate natural frequency and corresponding mode shapes for the fundamental mode only. Also draw mode shapes. **14**

OR

Q.5

Calculate base shear for the 10 story R.C. frame building for hospital located in a city of earthquake Zone – V, using seismic coefficient method for the following data

1. No. of bays in X – direction - 9
2. No. of bays in Y – direction - 7
3. Bay width in both direction – 4 m
4. Clear Story height below beam bottom – 3 m
5. Thickness of Slab - 140 mm
6. Size of web of Beam - 230 mm x 460 mm
7. Size of Column - 460 mm x 600 mm
8. Internal wall thickness - 120 mm
9. External wall thickness - 250 mm
10. Live Load - 4 kN/m^2

Assume suitable data if required. Give your calculation with appropriate clause number of code and draw shear distribution at each floor level.

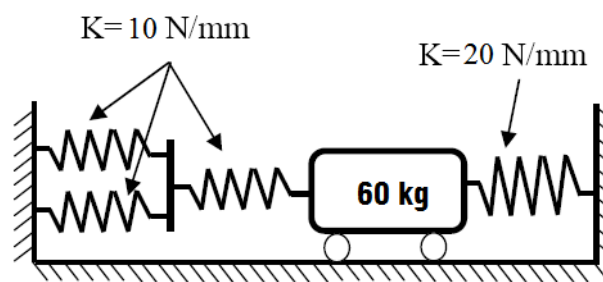


FIGURE - I Q - 2 (b) (OR)

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