

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE – SEMESTER – VI (OLD).EXAMINATION – WINTER 2016**

**Subject Code: 160605****Date: 24/10/2016****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. IS 1893 and IS 13920 are permitted.

- Q.1 (a)** For a RCC framed school building, find the design seismic base shear and lateral force at every floor level on the structure using static co-efficient method. Consider following data. **10**
- (1) Location : Bhuj (2) Soil condition : Medium soil  
 (3) Plan dimension : 2 bays of 4 m each along X direction and 2 bays of 4 m each along Y direction  
 (4) Elevation: 3 storey including Ground storey, each 3.5 m floor height  
 (5) Loading: Dead load is 15 kN/m<sup>2</sup> and live load is 3 kN/m<sup>2</sup> for floors.
- (b)** Explain importance of vibration analysis in detail. **04**
- Q.2 (a)** Derive an equation of motion for single degree free damped vibration system **07**
- (b)** Explain in detail classification of earthquake. **07**
- OR**
- (b)** Explain plate tectonic theory and its mechanism. **07**
- Q.3 (a)** Explain the earthquake resistance feature of masonry structures. **07**
- (b)** A vibrating system consisting of a mass of 50 kg and a spring of stiffness  $4 \times 10^4$  N/m is viscously damped. The ratio of two consecutive amplitudes is 20:16. Determine the natural frequency of undamped system. Also find damping ratio and damped natural frequency. **07**
- OR**
- Q.3 (a)** Give difference between (1) magnitude and intensity (2) strength and stiffness **07**
- (b)** A SDOF viscously damped system makes five complete oscillation per second. The amplitude of vibration reduces to 15% in 60 cycles. Find damping ratio. **07**
- Q.4 (a)** Analyze the two bay two storeys RC frame by Portal method. Lateral force of 100 kN & 60 kN is acting at first & second floor respectively. Height of each storey 4 m. Bay width of each bay is 4 m. Draw shear force and bending moment diagram. **07**
- (b)** Explain in detail (1) Rigid diaphragm (2) Centre of Mass and Centre of stiffness **07**
- OR**
- Q.4 (a)** Explain in detail concept of mathematical modeling **07**
- (b)** Explain soft storey and storey drift in details. **07**
- Q.5 (a)** Explain base isolation techniques in details. **07**
- (b)** Explain how “ductility of building” can be effectively design for earthquake resistance structure. **07**
- OR**
- Q.5 (a)** Explain Liquefaction and give remedial measures for it. **07**
- (b)** Discuss the capacity design concept in ductile detailing. **07**

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