

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VI(OLD) – EXAMINATION – SUMMER 2019****Subject Code:160605****Date:14/05/2019****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 and IS 13920 is permitted.

- Q.1** (a) Differentiate between static loading and dynamic loading. **07**  
(b) Derive an equation of motion for free damped vibration of single degree of freedom system. **07**

- Q.2** (a) Describe seismic waves briefly. **07**  
(b) Explain the method to locate epicenter of earthquake. **07**

**OR**

- (b) Explain box action of masonry walls. **07**

- Q.3** (a) Explain 'Strong column Weak beam' design concept **07**  
(b) Explain effect of structural irregularities under lateral loading. **07**

**OR**

- Q.3** (a) What are the basic principles and guidelines for efficient earthquake resistant design? **07**  
(b) Explain the following terms: (a) Soft storey, (b) Weak Storey, (c) Re-entrant corners, (d) Inertia force, (e) Pounding, (f) Ductility, Stiffness **07**

- Q.4** (a) What is rigid diaphragm effect and flexible diaphragm effect? Explain with figure. **07**  
(b) Explain ductile detailing of beam as per Indian standard 13920. **07**

**OR**

- Q.4** (a) What is centre of mass and centre of stiffness? Explain with figure. **07**  
(b) Give ductile detailing requirements for shear wall. **07**

- Q.5** (a) What are the factors affecting liquefaction characteristics? **07**  
(b) Write short note on base isolation of building. **07**

**OR**

- Q.5** (a) Explain restoration of earthquake damaged masonry structures. **07**  
(b) A one storey building is idealized as a rigid girder having weight  $W$  and weightless columns. During free vibration test a horizontal force of 9072 kg displaces the girder laterally by 0.508 cm. The maximum displacement at the end of the first cycle is 0.406 cm and the time period is 1.4 sec was observed after instantaneous release. Determine **07**  
i. The effective weight of the girder  
ii. Undamped frequency of vibration  
iii. Damping coefficient  
iv. Amplitude after first 6 cycles

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