

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-I Remedial Examination April 2010****Subject code: 711502****Subject Name: Structural Dynamics and Earthquake Engineering****Date: 07 / 04 / 2010****Time: 12.00 noon – 02.30 pm****Total Marks: 60****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.
5. Unit weight of concrete will be taken as 24 kN/m^3 until otherwise stated.

Q.1 (a) Four storied building (MRF with brick infill panels) with live load 3.0 kN/m^2 is to be constructed in seismic zone IV. Plan is shown in **Fig. 1**. Work out seismic forces on the structure by seismic coefficient method using IS 1893-2002. All the beams are $400 \times 500 \text{ mm}$ and columns are $400 \times 600 \text{ mm}$. Roof and floor slab thickness are 150 mm . Wall is of 250 mm thick all around only. Height of each floor is 3 m . **12**

Q.2 (a) Explain the following terms. Telesism, Micro Earthquake and Open ground story. **06**

(b) Differentiate the following terms. **06**

1. Storey drift and storey shear
2. Soft storey and weak storey

OR

(b) Differentiate the following terms. **06**

1. Importance factor and response reduction factor
2. Centre of mass and centre of stiffness

Q.3 (a) Explain viscously damped free vibration system in detail. **06**

(b) A platform of weight 18.16 kN is being supported by four equal columns which were clamped to the foundation. It has been found that a static force of 4.54 kN applied horizontally to the platform produces a displacement of 2.54 mm . Damping in the structure is of the order of 5% of the critical damping. Determine the following **06**

1. Un-damped natural frequency
2. Absolute damping coefficient
3. Logarithmic decrement

OR

Q.3 (a) Explain viscously damped forced vibration system in detail. **06**

(b) Write in detail the steps for model analysis. **06**

Q.4 (a) Workout the torsional seismic shear of various story only in X direction for plan of building shown in Fig. 1. Modulus of elasticity of concrete is $2.2 \times 10^7 \text{ kN/m}^2$. Unit weight of concrete and masonry are 24 kN/m^3 and 20 kN/m^3 . All other required dimensions have already been given in Q.1. **12**

OR

Q.4 (a) Explain the important features of ANSYS software. How this will differentiate with STAAD software? **06**

(b) Write difference between: 1) Base Isolators and Seismic Dampers 2) Strengthening and Retrofitting of the structures. **06**

- Q.5 (a)** What are structural considerations should be taken for non structural components to resist earthquake? **06**
- (b)** Explain the important features for the design of shear wall as per IS 13920. **06**
- OR**
- Q.5 (a)** What is liquefaction? Explain the causes and remedial measures of liquefaction. **06**
- (b)** How the architectural features affect the buildings during the earthquake? **06**
- Explain strong column and weak beam action.

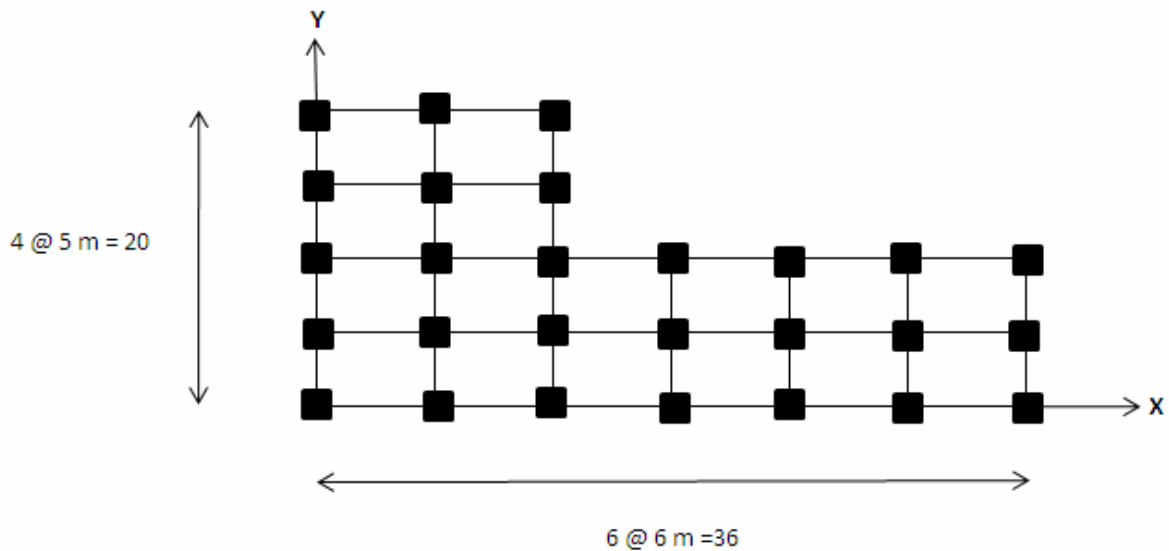


Fig. 1 Plan of four storied building (c/c line diagram)