

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER 2013****Subject Code: 160605****Date: 04-12-2013****Subject Name: Earthquake Engineering****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Draw neat and clean sketches whenever required.
5. IS 13920, IS 1893, IS 4326 IS 13835 and IS 13828 are permitted.

- Q.1 (a)** A four storied square RC framed building shown in Fig. 1 with live load 4 kN/m^2 is to be constructed in Surat. Work out seismic forces on the structure by seismic coefficient method using IS 1893. All beams and columns size $300 \text{ mm} \times 400 \text{ mm}$. Thickness of roof and floor slab 120 mm thick. Wall is of 150 mm thick all around. Height of each floor 3 m . Density of concrete 25 kN/m^3 . **10**
- (b)** Explain in short “Rigid Diaphragm Effect”. **04**
- Q.2 (a)** Locate the center of mass and center of stiffness for the Fig. 2. All column sizes are $300 \text{ mm} \times 600 \text{ mm}$. **07**
- (b)** Discuss the behavior of the following masonry walls in seismic regions. **07**
- (i) Unreinforced masonry wall
 - (ii) Reinforced Masonry wall
 - (iii) Infill masonry wall.
- OR**
- (b)** Draw the detailed sketch of (i) Different ways of beam jacketing as IS code and (ii) Placing of vertical bars and closed ties in columns as per IS code. **07**
- Q.3 (a)** Explain the terms (i) Story drift and story shear (ii) soft story and weak story **08**
- (b)** With detail sketch explain the essential requirements to ensure box action in a masonry building. **06**
- OR**
- Q.3 (a)** Explain earthquake design philosophy for buildings. **07**
- (b)** Explain seismic surface waves with schematic diagrams. **07**
- Q.4 (a)** Derive the equation of motion and its solution for forced damped vibration system. **08**
- (b)** Write short note on mathematical modeling. **06**
- OR**
- Q.4 (a)** Derive the equation of motion and its solution for forced undamped vibration system. **08**
- (b)** Write short note on “Logarithmic Decrement”. **06**
- Q.5 (a)** A spring mass dashpot system having a spring of stiffness of 343 N/m . the mass of 3.43 kg displaced 32 cm beyond the equilibrium position and release to vibrate. Derive the equation of motion for the given system. Assume damping coefficient $= 13.72 \text{ N.s/m}$. **07**
- (b)** Explain the term in detail “Peak Ground Acceleration”. **07**
- OR**
- Q.5 (a)** Determine the natural frequency of the system shown in Fig.3. $EI = 3 \times 10^{13} \text{ N.mm}^2$. **07**
- (b)** Write in short note on “Soil Liquefaction” and its effect. **07**

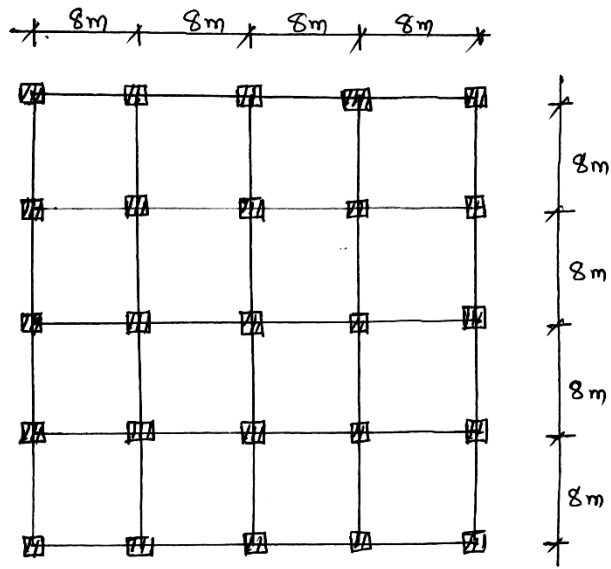


Fig. 1
(Q.1(a))

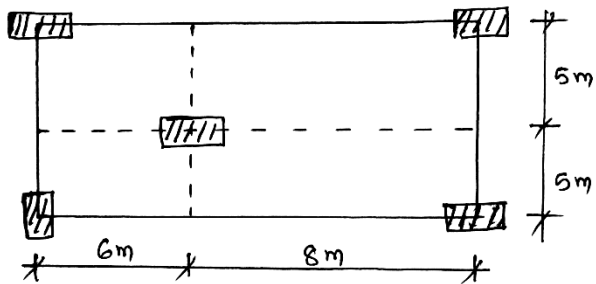


Fig. 2
(Q.2(a))

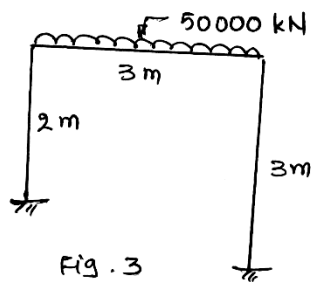


Fig. 3
(OR (Q.5(a)))
