Shantilal Shah Engineering College- Bhavnagar

Applied Mechanics Department

B.E. 7th Semester Civil Engineering Subject:

Earthquake Engineering (2170612)

Assignment No. 1

Earthquake Basics

1. Differentiate between magnitude and intensity.
2. Give expression for (i) local magnitude (ii) Surface magnitude (iii) Moment magnitude.
3. Draw neat sketch of seismograph and enlist its components.
4. Define the terms: (i) epicentre (ii) Hypocentre (iii) Aftershocks (iv) Aseismic (v) Mesoseismal (vi) Seismogram (vii) Accelerogram
5. Enlist various causes or earthquake.
6. List the seismic waves generated during earthquake. Which of these waves are dangerous for building structures?

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Last Date of Submission:- 09/08/2018

Assignment No. 2

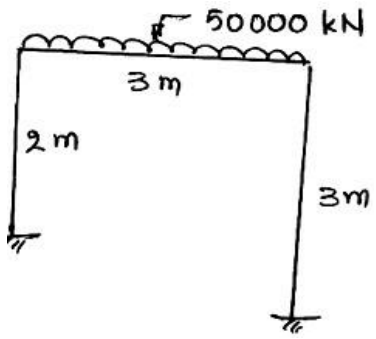
Fundamentals of Earthquake Vibrations of Buildings

1. Define: (i) Vibration (ii) Oscillation (iii) Damping (iv) Resonance (v) Free Vibration

2. Explain spring in Series & in Parallel. What is Mathematical modeling? Write the assumptions made in it.

3. Derive the equation of response of SDOF for free undamped & Damped vibration system.

4. Find out the natural frequency of building frame as shown in Fig below. Take EI = 3 X 10^{13}Nmm^2

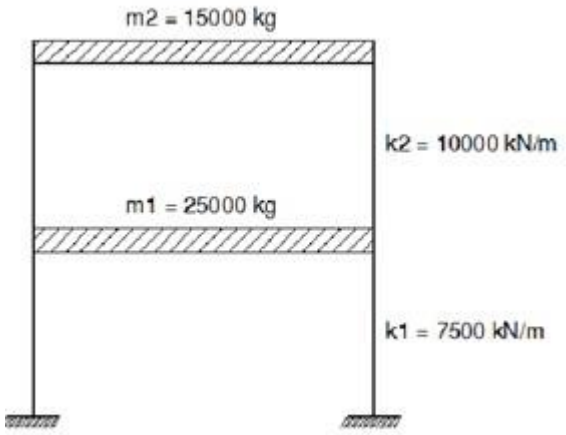


5. A two bay single storey RCC plane frame in which lumped mass of 20 ton is supported on three columns (AB, CD & EF) having fixed support. L_{AB} = 0.5m L_{CD} = 0.25m L_{EF} = 2 m Calculate (i) Natural frequency of damped vibration (ii) BM & SF at support for the RCC frame after five cycles of vibration if floor is displaced horizontally by 300mm & suddenly released. Assume rigid diaphragm action. Take fck = 25 MPa & size of column 600 mm x 600 mm. Assume 5% damping

6. A SDOF system having the amplitude of vibration in successive cycle are 0.90, 0.45, 0.23, 0.11 units respectively. Determine damping ratio of the system.

7. A simply supported beam of negligible mass spanning 6 m supports a machine of 50 kN at center with an unbalanced rotor applying a vertical force of 60 sin 5 t kN. The damping force is 0.3 kN-s/m & Flexural rigidity of beam is 25000 kNm^2. Determine (i) maximum amplitude of vibration (ii) amplitude of vibration at resonance

8. Find out the natural frequencies and draw the corresponding mode shapes for the given frame as shown in fig below.



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Assignment No. 3

Design Philosophy

1. For a RCC framed office building, find the design lateral forces and its distribution along the height, using static co-efficient method. Consider following data.

Location : Gandhidham
Soil condition : Medium soil
Plan dimensions: 5 bays of 6 m each along X direction and 6 bays of 5 m each along Y direction
Elevation : 6 storey including Ground storey , each with 3.5 m floor height
Columns : 400 x 400 mm all
Beams : 300 x 500 mm
Slab : 150 mm thick RCC
Walls : outer 230 mm brick masonry, inner 150 mm brick masonry
Parapet walls: 230 mm thick 1 m ht.brick masonry.

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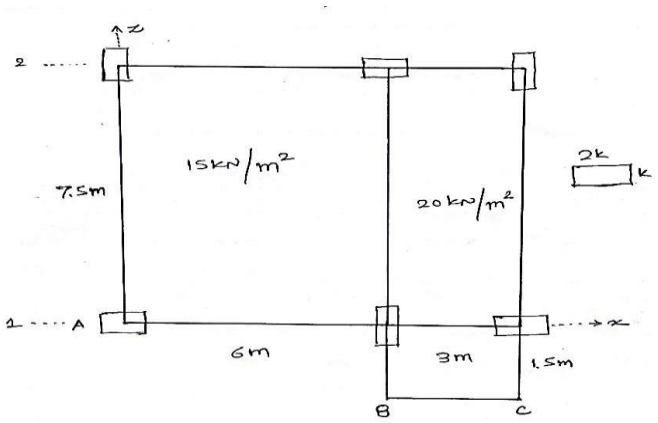
Lateral Loads on Buildings

1. Explain 'rigid diaphragm' and 'Flexible diaphragm'.
2. Distinguish between 'Centre of mass' and 'Centre or stiffness'.
3. Define the terms: 1. Diaphragm action 2. Rigid diaphragm 3. Flexible diaphragm 4. Centre of mass 5. Centre of rigidity
4. For a single storey building with Storey height 3 m shown in figure below located on hard soil. The following data is given. Z=0.24,I=1,R=5,tnz=0.1sec. Calculate the center of mass and center of stiffness. Find out the design eccentricities.



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