

Name: \_\_\_\_\_

University of California, Berkeley  
Civil and Environmental Engineering

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Spring Semester 2008

## **CE 227 - Earthquake Resistant Design**

### **Midterm Examination 1 (Take Home)**

This examination is open book and notes.

Unless specified otherwise, you may assume firm soil conditions, 5% viscous damping, and ideal elasto-perfectly plastic hysteretic behavior. Newmark and Hall procedures for constructing and interpreting response spectra may generally be used. You may make other assumptions as appropriate, but be sure to identify them.

Please cite all specific sources of information, equations and websites that you use in solving these problems.

This examination is intended to take no more than 90 minutes.

The exam should represent your own work, and you should not discuss the problems with other students once you start the exam.

Clarifications as needed to the exam will be posted on the class blog.

The exam is due at the beginning of class on April 8, 2008 unless other arrangements are made with the instructor in advance.

If you have questions about the exam, please contact me via email at [mahin@berkeley.edu](mailto:mahin@berkeley.edu).

***Good Luck***

1. \_\_\_\_\_ (35)

2. \_\_\_\_\_ (15)

3. \_\_\_\_\_ (25)

4. \_\_\_\_\_ (25)

Total \_\_\_\_\_ (100)

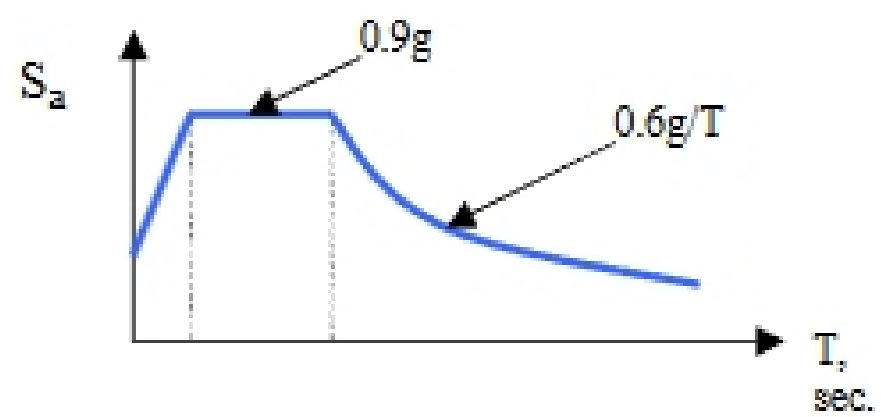
**Problem 1**

a. List two or more basic types of seismic hazard other than ground shaking that should be checked when designing a structure?

i.

ii.

b. Considering the pseudo-spectral acceleration response spectrum shown to the right, what is the minimum lateral stiffness required for an ELASTIC system if the system must have a maximum lateral displacement less than or equal to 8 inches. The structure has a mass of  $1\text{k-sec}^2/\text{in}$ .



- c. To decrease the seismic-induced displacements during elastic response by 20%, by what percentage should you change the structure's lateral stiffness (holding other systems properties constant)?
- d. The damping value for the system in part b is changed from 5% to 20% of critical by adding supplemental energy dissipation devices. By what percentage would you expect the base shear of the structure to change (assuming mass and stiffness remain constant)?