NTUA – SCHOOL OF CIVIL ENGINEERING **6/4/2012**

CB22. ENGINEERING SEISMOLOGY

EXERCISE No 5

For a bridge of period T=1.0 sec, use the EC8 response spectrum for a_g=0.16 g and site class B in order to:

- Create an artificial accelerogram with the help of the given time envelope
- Create semi artificial accelerograms from the 01113L, 00810T and 00006L real records given at the laboratory site
- Scale the 01113L, 00810T and 00006L real records to the given EC8 spectrum according to the EC8 provisions
- Scale the 01113L, 00810T and 00006L real records to the spectral value of the EC8 spectrum for the period of the bridge.

Calculate the yield acceleration a_y of the bridge according to the EC8 spectrum for a behavior (reduction) factor q=3 (neglect any overstrength), and estimate, for each of the obtained records, the ductility demand and the q factor that will be developed during the earthquake.

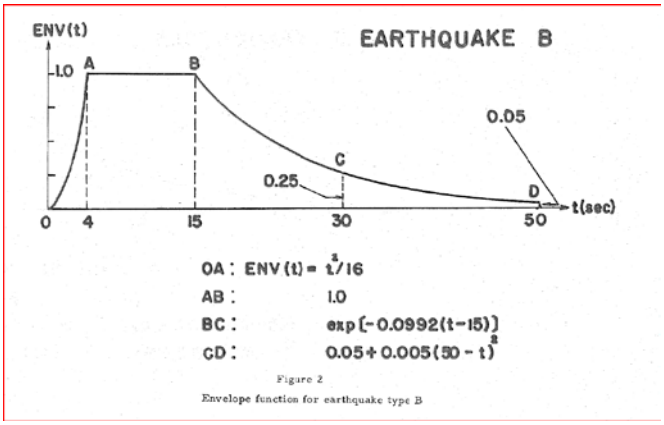

Figure 2
Envelope function for earthquake type B

EC8 SCALING PROVISIONS

a. *a minimum of 3 accelerograms should be used*;
b. *the mean of the zero period spectral response acceleration values (calculated from the individual time histories) should not be smaller than the value of a_g S for the site in question;*[6]
c. *in the range of periods between $0,2T_1$ and $2T_1$, where T_1 is the fundamental period of the structure in the direction where the accelerogram will be applied; no value of the mean 5% damping elastic spectrum, calculated from all time histories, should be less than 90% of the corresponding value of the 5% damping elastic response spectrum.*[7]