

CLARKSON UNIVERSITY
Department of Mechanical and Aeronautical Engineering
Spring Semester 2005
AE/ME 455 Mechanical Vibrations

LEARNING OBJECTIVES FOR EXAM II

These should serve as your "roadmap" in studying for the exam. They are a statement of what I expect from the students taking this course. If it is mentioned here it may be on the exam. If it is not mentioned here, it will not be on the exam.

1. For forced vibration of single degree of freedom, linear mechanical systems, both undamped and damped, you should be able to determine the equation of motion when force- or displacement-based excitations are applied. You should be able to determine both transient and steady state responses - displacements, velocities and accelerations as a function of time for harmonically excited systems. You should understand the difference between *harmonic*, *periodic* and *nonperiodic* motion and/or excitation. You should be able to determine the frequency response - both amplitude and phase shift - for harmonically excited systems. You should be able to describe the meaning of *resonance* in words or using graphs and equations. You should be able to determine transmitted forces for vibration isolation or base excitation problems.
2. If I give you a simple periodic function with period τ (graphical representation), you should be able to write down an expression for the Fourier Series representation of the function. You should be able to obtain an analytic expression for the periodic function on the required interval and set up integrals for the Fourier coefficients. You will not be required to evaluate difficult integrals on the test.
3. Given the Fourier series representation for a periodic excitation, you should be able to obtain the steady state response for a single degree-of-freedom mechanical system to that periodic excitation.
4. You should be able to obtain the response of a single degree-of-freedom system to an impulse excitation, given the magnitude of the impulse.