MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF OCEAN ENGINEERING
AND
CIVIL AND ENVIRONMENTAL ENGINEERING
13.013J/1.053J Dynamics and Vibration
Units : 5-0-7
Fall 2002

Prerequisite Survey and Questionnaire

Name : Email :

- Please fill the following prerequisite table.

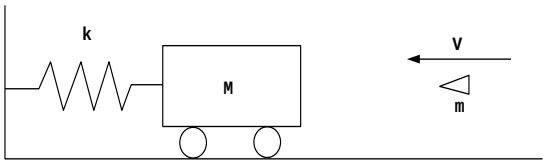
Courses	Term	Grade
18.03		
2.001 or 1.050		
2.003 or 13.015J/1.015J or 1.00		

- Please rate yourself with respect to the following topics in order for the faculty to customize the course contents and teach effectively.
  1: No Knowledge, 10: Excellent Knowledge

Conservation of energy	(1-2-3-4-5-6-7-8-9-10)
Principle of conservation of linear momentum	(1-2-3-4-5-6-7-8-9-10)
Principle of conservation of angular momentum	(1-2-3-4-5-6-7-8-9-10)
Solution of second order ODE	(1-2-3-4-5-6-7-8-9-10)
Free body diagram and equations of motion	(1-2-3-4-5-6-7-8-9-10)
Frequency response of a linear system	(1-2-3-4-5-6-7-8-9-10)
Principle of superposition	(1-2-3-4-5-6-7-8-9-10)
The rate of change of momentum	(1-2-3-4-5-6-7-8-9-10)
Stress and strain	(1-2-3-4-5-6-7-8-9-10)
Beam theory	(1-2-3-4-5-6-7-8-9-10)
Torsion	(1-2-3-4-5-6-7-8-9-10)
Energy methods for finding equations of motion	(1-2-3-4-5-6-7-8-9-10)
Projectile motion	(1-2-3-4-5-6-7-8-9-10)

Please attempt to solve the following three problems.

1. A block of wood of mass M is attached to the wall with a spring of spring constant k. A bullet of mass m is fired with a velocity of magnitude V into the block. Determine how far the block will move. Note that the bullet remains in the block after the collision.



2. Solve the following differential equations.

   (a) $m\ddot{x} + kx = 0 \quad for \;\; \dot{x}(0) = v, \;\; x(0) = 0$

   (b) $\ddot{x} + w_o^2 x = f_o \sin(wt)$

3. Draw a free body diagram and write the equation(s) of motion of the pendulum below.