CHENNAI MATHEMATICAL INSTITUTE
CLASSICAL MECHANICS I
QUIZ I

31st August 2012 Time allowed
1 hour

Attempt both the questions
Each question carries 10 marks

1. Consider the forced oscillation of an one-dimesional damped simple harmonic oscillator with a periodic external force given by

$$F(t) \;=\; A \text{ where} -\epsilon < \text{t} < \epsilon$$

and

$$F(t) \;=\; 0 \text{ when } \epsilon < \text{t} < \tau - \epsilon$$

and $F(t + \tau) = F(t)$.

Find the solution for the displacement (assume the homogenious part has decayed away)

2. A massless pully is attached to a fixed ceiling by means of a massless spring with spring constant k. A mass m is suspended with a massless inextensible string of length L the other end of which is attached to the floor after passing through a massless pully as shown as shown in the figure. Find the frequency of oscillation from the stable equilibrium. Natural length of the spring is L_0

(Figure on the back side)

SPRING (Massless)

P, PULLY (Massless)

Massless string

m