Tutorial-4 (PHY201) Due on Wednsday

1. A uniform string of length 2.5 m and mass 0.01 Kg is placed under a tension of 10N.
   (a) What is the frequency of its fundamental mode?
   (b) If the string is plucked transversely and is then touched at a point 0.5 m from one end, what frequencies persist.

2. A string with tension T and mass per unit length mu is calmped down at x=0 and x=L. At t=0, the string is at rest and displaced in y direction:
$$y(x, 0) = 2\sin\left(\frac{2\pi x}{L}\right) + 3\sin(\frac{\pi x}{L})$$
   (a) What is the total energy at t=0? (The string is released at t=0 and it starts to oscillate.)
   (b) What is the displacement at time t?
   (c) At what time t will the string for the first time have exactly the same shape as it did at time t=0? Or will this never happen? Give your reason.

3. A very long string of linear density 0.1g/cm is stretched with a tension of 400N. It is driven at one end in harmonic motion of amplitude 1cm and frequency 100Hz. Calculate the time averaged energy flux in Watts.

4. Show that the Kinetic and Potential energy densities are equal for a travelling wave on the string.

5. You may ask any doubt regarding the solution of the Mid-Sem questions.