EXAM 3 PHYS 103 Spring 2013 **A**

Equation Sheet

Waves: $v = \lambda \cdot f$ linear mass: $\mu = \frac{m}{L}$ $v = \sqrt{\frac{F}{\mu}} = \sqrt{\frac{Tension}{\mu}}$

sound: $v = 343$ m/s $v = 331$ m/s $\sqrt{\frac{T}{273\,K}}$

$I_0 = 10^{-12}$ W/m^2 $I = \frac{E}{t \cdot A}$ $I = \frac{P}{4\pi R^2}$ $\beta = 10dB \log \frac{I}{I_0}$ $\beta_2 - \beta_1 = 10dB \log \frac{I_2}{I_1}$ $f = f_0 \frac{v_{sound} \pm v_d}{v_{sound} \mp v_s}$

standing waves: on string and in open pipe at both ends: $n = 1, 2, 3.,$ $f = \frac{v}{2L} n$ $\lambda = \frac{2L}{n}$

in pipe closed at one end: $n = 1, 3, 5, \ldots$ $f = \frac{v}{4L} n$ $\lambda = \frac{4L}{n}$

interference: constructive: $d_2 - d_1 = n\lambda$ $f = \frac{v}{d_2 - d_1} n$ destructive: $d_2 - d_1 = (n + \frac{1}{2})\lambda$ $f = \frac{v}{d_2 - d_1} (n + \frac{1}{2})$

Electric charge: $q = Ne$ $F = k \frac{q_1 q_2}{r^2}$ $E = k \frac{q}{r^2}$ $F = qE$ $qE = ma$

$k = 8.99 \times 10^9$ Nm^2/C^2 $e = 1.6 \times 10^{-19}$ C $m_e = 9.11 \times 10^{-31}$ kg Circuits: $R = \rho \frac{L}{A}$;

$R = R_0[1 + \alpha(T - T_0)]$; $V = I*R$ $I = \frac{\Delta q}{\Delta t} = \frac{Ne}{t}$; $Q = mc\Delta T$ $P = \frac{E}{\Delta t}$ $P = I^2 R$

$P = \frac{V^2}{R}$ $P = I*V$; in series : $R_{eq} = R_1 + R_2 + \ldots + R_n$ in parallel: $1/R_{eq} = 1/R_1 + 1/R_2 + \ldots + 1/R_n$