

Formula Sheet (1st midterm)

$$f = \frac{1}{T}; \quad v = \lambda f; \quad v = \sqrt{\frac{F}{m/L}} \text{ (String); } v = \sqrt{\frac{\gamma k T}{m}} \text{ (Ideal gas);}$$

$$\Delta s = n\lambda \quad n = 0,1,2,3\dots \quad \text{(Constructive interference)}$$

$$\Delta s = (n + \frac{1}{2})\lambda \quad n = 0,1,2,3\dots \quad \text{(Destructive interference)}$$

$$v = \sqrt{\frac{B_{ad}}{\rho}} \text{ (Liquid); } v = \sqrt{\frac{Y}{\rho}} \text{ (Solid); } y = A \sin\left(2\pi ft \mp \frac{2\pi x}{\lambda}\right) \text{ (Wave function);}$$

$$I = \frac{P}{A} \text{ (Sound intensity); } \sin \theta = \frac{\lambda}{D} \text{ [rectangular Slit] \& } \sin \theta = 1.22 \frac{\lambda}{D} \text{ [circular] (Diffraction);}$$

$$f_o = f_s \left(\frac{1}{1 \pm \frac{v_s}{v}} \right) \text{ (Moving source), } \begin{cases} - \text{ toward;} \\ + \text{ away} \end{cases} \quad f_o = f_s \left(1 \pm \frac{v_o}{v} \right) \text{ (Moving observer), } \begin{cases} + \text{ toward;} \\ - \text{ away} \end{cases}$$

$$f_{beat} = |f_1 - f_2| \text{ (Beat frequency); } f_n = n\left(\frac{v}{2L}\right) \quad n = 1,2,3,\dots \text{ (String fixed at both ends);}$$

$$f_n = n\left(\frac{v}{2L}\right) \quad n = 1,2,3,\dots \text{ (Tube open at both ends);}$$

$$f_n = n\left(\frac{v}{4L}\right) \quad n = 1,3,5,\dots \text{ (Tube open at only one end);}$$

$$N = \frac{q}{e} \text{ (Number of charge); } F = \frac{kq_1q_2}{r^2} \text{ where } [k = 8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2] \text{ (Coulomb's law);}$$

$$F = q_0E; \quad E = \frac{kq}{r^2} \text{ where } [k = 8.99 \times 10^9 \text{ N}\cdot\text{m}^2/\text{C}^2] \text{ (Point charge);}$$

$$E = \frac{q}{\epsilon_0 A} = \frac{\sigma}{\epsilon_0} \text{ where } [\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/(\text{N}\cdot\text{m}^2)] \text{ (Parallel plate capacitor);}$$

Appendix

$$F = kx \text{ (Spring motion); } E = Pt \text{ (Energy–Power relation);}$$

$$F = ma \text{ (Newton's equation of motion)}$$

$$\text{Surface area of sphere} = 4\pi r^2; \quad \text{Area of circle} = \pi r^2$$

$$\text{M (mega)} \quad \times 10^6$$

$$\text{k (kilo)} \quad \times 10^3$$

$$\text{m (milli)} \quad \times 10^{-3}$$

$$\mu \text{ (micro)} \quad \times 10^{-6}$$