RELATIONSHIPS AND DEFINITIONS

This information will be on your exam paper immediately following question 4. If question 4 finishes at the end of a page, this will be on the next page.

It is up to you to know what the symbols mean and to which problems this information might apply.

You may find some of the following relationships and definitions useful:

$I = C\dfrac{dV}{dt}$ $\qquad \omega = 2\pi f$ $\qquad V(t) = (V_{START} - V_{FINISH})\exp\left(\dfrac{-t}{\tau}\right) + V_{FINISH}$

$V_{AVE} = \dfrac{V_P}{\pi}$ for a half wave rectified sinusoid $\qquad V_{rms} = \dfrac{V_P}{\sqrt{2}}$ for a sinusoid

$V_{AVE} = \dfrac{V_P}{4}$ for a half wave rectified triangular wave $\qquad V_{rms} = \dfrac{V_P}{\sqrt{3}}$ for a triangular wave

$V_{AVE} = \dfrac{V_P}{2}$ for a half wave rectified square wave $\qquad V_{rms} = V_P$ for a square wave

$v_o = A_v\,(v^+ - v^-)$ $\qquad A_v = \dfrac{A_0}{1 + s\,\tau_0} = \dfrac{A_0}{1 + j\dfrac{\omega}{\omega_0}}$ $\qquad \overline{v_n^2} = 4kTR\ \text{V}^2\,\text{Hz}^{-1}$

$\overline{i_n^2} = 2eI\ \text{A}^2\,\text{Hz}^{-1}$ $\qquad \overline{v_n^2} = \dfrac{kT}{C}\ \text{V}^2$ $\qquad e =$ electronic charge $= 1.602 \times 10^{-19}\text{C}$

$k =$ Boltzmann's constant $= 1.38 \times 10^{-23}\ \text{J K}^{-1}$ $\qquad$ Room temperature $= 300$ K

Second order standard forms are:

$$\frac{v_o}{v_i} = k\,\frac{1}{\left(1 + \dfrac{s}{\omega_n q} + \dfrac{s^2}{\omega_n^2}\right)} \qquad \frac{v_o}{v_i} = k\,\frac{\dfrac{s}{\omega_n q}}{\left(1 + \dfrac{s}{\omega_n q} + \dfrac{s^2}{\omega_n^2}\right)} \qquad \frac{v_o}{v_i} = k\,\frac{\dfrac{s^2}{\omega_n^2}}{\left(1 + \dfrac{s}{\omega_n q} + \dfrac{s^2}{\omega_n^2}\right)}$$

unit multipliers: p = x10^{-12}, n = x10^{-9}, μ = x10^{-6}, m = x10^{-3}, k = x10^{3}, M = x10^{6} G = x10^{9}

All the symbols have their usual meanings