Exam 1 Equations

Equations you need to know:

$$l = \frac{v}{f}$$

$$C = BW \times \log_2(1 + SNR)$$

Equations for FM analysis – deviation, deviation rate, Bessel analysis. A Bessel table will be provided for you on the test.

$$BW \approx 2(d + f_m)$$

$$d = f_{\max} - f_c$$

$$d = V_{m(pk)} K_0$$

$$DR = f_m$$

$$m_f = \frac{d}{f_m}$$

$$V_{SB[n]} = V_C J_{[n,m_f]}$$

$$v_p = \frac{1}{\sqrt{LC}} \qquad Z_0 = \sqrt{\frac{L}{C}} \qquad Z_0 = \frac{V}{I}$$

$$VF = \frac{v_p}{c} \qquad VF = \frac{1}{\sqrt{e_r}}$$

Dielectric constant values will be provided for you on the test as needed.

$$SWR = \frac{V\max}{V\min} \qquad \Gamma = \frac{Z_R - Z_0}{Z_R + Z_0} \qquad SWR = \frac{1 + |\Gamma|}{1 - |\Gamma|}$$

$$VSWR = \frac{Z_R}{Z_0} \text{ or } \frac{Z_0}{Z_R}$$

Don't forget that the "simple" VSWR formula is only good for purely-resistive terminations.

$$V_{REF} = V_{INC} \times \Gamma \qquad P_{fwd} = \frac{V_{INC}^2}{Z_0}; P_{ref} = \frac{V_{REF}^2}{Z_0}$$

$$P = \frac{G_t P_t}{4\pi d^2} \qquad E \approx \frac{\sqrt{30 P_t G_t}}{d} \qquad Z = \frac{E}{H}$$

Basic far-field relationships. We'll be using these extensively in the next section for link-budget calculations. P, E, Z, and H are script – MS Equation editor unfortunately doesn't render them this way.