

Notes for the Midterm

1. The sample problems for the previous quizzes are suggested to review again.
2. How can narrowband FM modulated signal $s_{\text{FM}}(t) = A_c \cos(2\pi f_c t + 2\pi k_f \int_0^t m(\tau) d\tau)$ be approximated by an AM (DSB-C) modulated signal when $m(t) = A_m \cos(2\pi f_m t)$?
3. Derivation of the spectrum of the single-tone FM modulated signal and its PSD
4. Carson's rule and Universal-curve based rule for transmission bandwidth of FM modulated signal
5. Direct demodulation (i.e, balanced frequency discriminator), for FM modulation, in particular the formula of demodulation output.
6. Block diagram of FM stereo multiplexing
7. Given f_{IF} and f_{LO} , how to determine the image interference $f_{\text{Interference}}$ of a f_{RF} ?
8. Definitions of SNR_I , SNR_O and SNR_C and their computations for DSB-SC and SSB under coherent detection, DSB-C under envelope detection and FM under limiter/balanced discriminator. (Note that Slides 2-140 ~ 2-149 are out of the scope of all exams.)
9. (i) PSD of the effective noise of FM demodulator, (ii) how to do FM threshold reduction using FMFB, and (iii) how to do FM threshold reduction using pre-emphasis and de-emphasis filters