

大葉大學 九十四 學年度 研究所碩士班 招生考試試題紙

系 所 別	組 別	考 試 科 目 (中文名稱)	考 試 日 期	節 次	備 註
電信工程學系 碩 士 班	乙	通 訊 原 理	3月27日	第三節 13:30~15:00	共2頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

- (10%) What is the function of a Componder, a combination of compressor and expander, in a digitizing an analog signal?
- (10%) Describe the principle of the FM signal detection, and list four different types of frequency discriminators.
- (30%) A Linear Time Invariant (LTI) system has a impulse response of $h(t) = \text{sinc}(2Wt)$, and has a input and output of $x(t)$ and $y(t)$, respectively.
 - Determine the transfer function of the LTI system.
 - For $W= 50$ Hz and a input signal of $x(t) = a + b \cos(20\pi t) - c \sin(80\pi t) + d \cos(120\pi t)$, find the output signal, $y(t)$.
 - Draw a single-sided line spectrum for $y(t)$.
- (20%) A binary phase shift keying (BPSK) has a form of $s_i(t) = m(t)A \cos(\omega_c t)$ $i = 0, 1$ $0 \leq t < T_b$, where $m(t)$ represents the binary message and has a value of 1 or -1 for logical "1" and "0", respectively. This BPSK signal is transmitted through an additive white Gaussian noise (AWGN) channel with a double-sided power spectral density (PSD) of $N_0/2$.
 - Find the average bit energy in terms of A and T_b .
 - For $A=3$, $T_b=1$ and $N_0=0.3$, find the bit error probability for this BPSK system in terms of Gaussian Q-function or complementary error function.
- (30%) If an analog signal has a spectrum, $\Lambda(f/2B)$, as shown in Figure 1 and a carrier frequency of f_c , then determine the signal spectrum (in equations or in graphs) for
 - an AM modulation signal having a modulation index of 80%, and
 - a DSB-LC modulation signal.
 - Calculate the required bandwidth for an FM modulation signal having a modulation index of $\beta=5$.

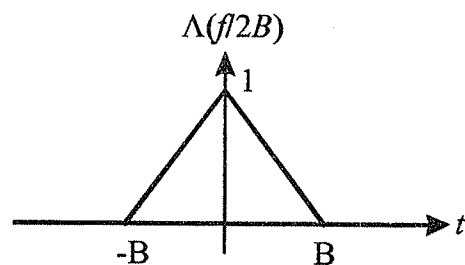


Figure 1