國立彰化師範大學106學年度碩士班招生考試試題

系所：電信工程研究所(選考丙)、資訊工程學系(選考庚)　　科目：通訊原理
資訊工程學系積體電路設計碩士班(選考庚)

☆☆請在答案紙上作答☆☆　　

1. Please explain the following terminologies: (30%)
   (1) AWGN
   (2) lowpass filter
   (3) channel coding
   (4) QPSK
   (5) bit error probability

2. A superheterodyne FM receiver operates in the frequency range 88-108 MHz. This frequency range is denoted as f_{RF}.
   (1) Plot the block diagram of a superheterodyne FM-radio receiver. (7%)
   (2) If the intermediate frequency f_{IF} is set at 10.7 MHz and a local-oscillator frequency f_{LO} is chosen so that $f_{LO}>f_{RF}$. Determine the frequency range of f_{LO} so that an FM signal can be demodulated. (7%)
   (3) What is the range of image frequency? (7%)
   (4) Determine the passband and stopband specifications of the RF amplifier. (7%)

3. The received signal in a binary communication system that employs antipodal signals is

$$r(t)=s(t)+n(t),$$

   where $s(t)$ denotes the binary signal and $n(t)$ is AWGN with power spectral density $N_0/2$.
   The waveform $s_0(t)$ for binary "0" is shown in Fig. 1. The bit duration is T_b.
   (1) Design the waveform $s_1(t)$ for binary "1". (7%)
   (2) Sketch the impulse response of the filter matched to $s_0(t)$. (7%)
   (3) Sketch the output of the matched filter when the input signal is $s_0(t)$. (7%)
   (4) Sketch the matched-filter-type demodulator for the binary communication system. (7%)
   (5) Determine the variance of the noise at the output of the matched filter at $t=T_b$. (7%)
   (6) Determine the probability of error in terms of A, T_b, and N_0. (7%)

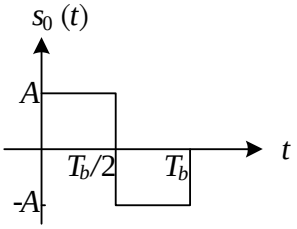

Fig. 1