國立彰化師範大學 101 學年度碩士班招生考試試題

系所：電信工程學研究所　　科目：通訊原理

☆☆請在答案卷上作答☆☆　　

1. Find the Fourier transforms of the following three functions. (30%)
   (a) $x_1(t) = \cos(2\pi f_c t)$
   (b) $x_2(t) = \exp(-t^2)$
   (c) $x_3(t) = \begin{cases} 1, 0 \le t \le 1 \\ 0, \text{otherwise} \end{cases}$

2. Plot the block diagram of an AM superheterodyne receiver. If the intermediate frequency f_{IF} of the receiver is fixed at 455 kHz and the intended channel is located at 9.774 MHz, what is the frequency of local oscillator? (20%)

3. Consider a 4-ASK communication system with transmitted power P and transmission bit rate R_b. (30%)
   (a) Plot the block diagrams of the transmitter and receiver.
   (b) Derive the bit error rate of the 4-ASK system over an AWGN channel with two-sided spectral density $N_0/2$.

4. An analog signal, whose maximum frequency f_m = 4 KHz, is sampled at its Nyquist rate, quantized using 256 quantization levels, and then transmitted using a 16-QAM system. Find the theoretical minimum system bandwidth that avoids ISI. (20%)