

國立臺北科技大學 107 學年度碩士班招生考試

系所組別：2141 電機工程系碩士班丁組

第一節 通訊原理 試題(選考)

第一頁 共一頁

注意事項：

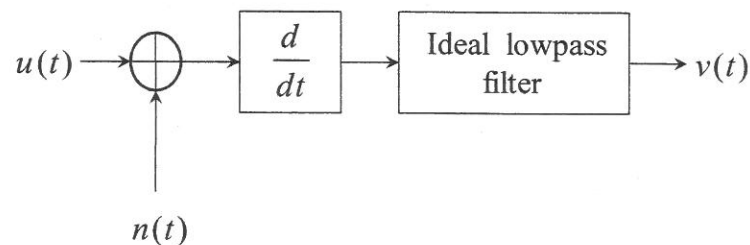
1. 本試題共五題，每題 20 分，共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、(20%)

The signal $x(t) = \begin{cases} 1, & 0 \leq t \leq 3 \\ 0, & \text{else} \end{cases}$ is input to a linear time-invariant system with impulse response $h(t) = \begin{cases} 1, & 0 \leq t \leq 2 \\ 0, & \text{else} \end{cases}$. Find the output signal $y(t)$.

二、(20%)

Consider the following system. If $u(t) = A \cos(2\pi f_u t)$, $n(t)$ is the white noise of power spectral density $N_0/2$, and the bandwidth of the ideal lowpass filter is W ($W > f_u$), calculate the signal-to-noise ratio in $v(t)$.



三、(20%)

If $m(t) = 400 \text{ sinc}^2(200t)$ is DSB modulated with carrier frequency $f_c = 1000$ Hz, plot the amplitude spectra of $m(t)$ and the modulated signal $s(t)$.

四、(20%)

In a BPSK system, the two signals are defined by $s_1(t) = A_c k \sin(2\pi f_c t) + A_c \sqrt{1-k^2} \cos(2\pi f_c t)$ and $s_2(t) = A_c k \sin(2\pi f_c t) - A_c \sqrt{1-k^2} \cos(2\pi f_c t)$, $0 < k < 1$, $0 \leq t \leq T_b$. In the presence of additive white Gaussian noise of zero mean and power spectral density $N_0/2$, calculate the average probability of error.

五、(20%)

Consider the (7,4) linear block code with parity check matrix $\begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 & 1 \end{bmatrix}$.

If (1 0 0 1 1 1 1) is received, find the decoded codeword by using the syndrome decoding method.