國立雲林科技大學 105 學年度
碩士班招生考試試題

系所：電機系
科目：通訊原理

1. (10%) Consider a continuous-time complex exponential signal Ce^{at}, where C is expressed in polar form and a in rectangular form. That is, $C=|C|\,e^{j\theta}$ and $a=r+jw_0$. Please express Ce^{at} in rectangular form.

2. (a) (5%) Please show that why $e^{j\pi n}$ can be expressed as $(-1)^n$. Note that n is an integer. (b) (5%) Let the input and output signals of a system be denoted as $x(t)$ and $y(t)$, respectively. If the relation between system input and output is give as $y(t)=tx(t)$, is $y(t)$ stable? Also provide your explanation.

3. (15%) Consider an input signal $x(t)=e^{-at}u(t)$, $a>0$ and a system impulse response $h(t)=u(t)$, which are also shown in the figure. Please determine the system output using the convolution integral.
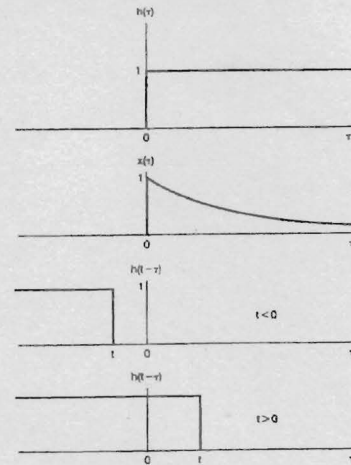
4. (10%) The sinc function is defined as $\text{sinc}\,(\theta)=\dfrac{\sin \pi\theta}{\pi\theta}$. Please represent the following signals in terms of sinc function: (a) $\dfrac{3\sin wT}{w}$; (b) $\dfrac{\sin Wt}{2\pi t}$.

5. (10%) Let $x(t)=1+\sin w_0 t+2\cos w_0 t+\cos(2w_0 t+\dfrac{\pi}{4})$. Please determine the Fourier coefficients of $x(t)$.

6. (15%) 二元對稱通道 BSC 其轉換機率圖如下
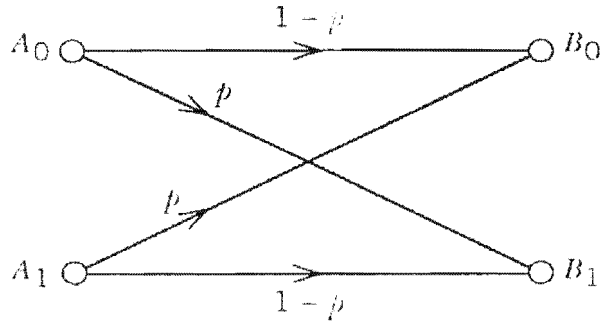
其中 傳送端 $A_0 = 0, A_1 = 1$ 及接收端 $B_0 = 0, B_1 = 1, p = 1/3$ 是錯誤機率。我們已知傳送端會送 0 的機率是 1/3，送 1 的機率是 2/3，今假定接收端接收到的是 0，那麼傳送端真的送的是 0 的機率多少？

7. (a) (5%)試說明奈奎士(Nyquist)取樣定理。(b)(10%)說明符元間干擾(Intersymbol interference)產生的原因及克服方式。

8. (15%)試說說明眼狀圖(Eye Pattern)的定義及用途。