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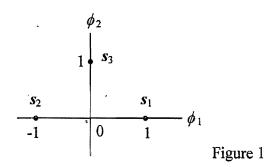
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國 立 雲 林 科 技 大 學 系所:通訊所 99 學年度碩士班暨碩士在職專班招生考試試題 科目:通信系統

- 1. (20%) Given c(t)=a(t)b(t), where $a(t)=\cos\omega_0 t$ and the Fourier transform of b(t) is $B(\omega)$ where $B(\omega) = 1$ for $|\omega| < \omega 1$ and $B(\omega) = 0$ for $|\omega| > \omega 1$
 - (a) (6%) Find C(ω) the Fourier transform of c(t).
 - (b) (7%)Let d(t)=c(t)a(t), find $D(\omega)$ the Fourier Transform of d(t).
- \sim (c), (7%) What is the minimum value of ω_0 which guarantees a complete recovery of B(ω).
- 2. (20%) Given x(t)=cos ω_0 t which is sampled by p(t) = $\sum_{K=-\infty}^{+\infty} \delta[t KT]$ to obtain the sampled

function $x_{p}(t)$. $X_{r}(t)$ is obtained by passing $x_{p}(t)$ through an ideal lowpass filter $H(\omega)$

- with cutoff frequency $\omega_c = \frac{\omega_s}{2}$, where $\omega_s = \frac{2\pi}{T} = 800$. Find X, (t) in the following:
- (a) $\omega_0 = 200$; (b) $\omega_0 = 300$; (c) $\omega_0 = 600$; (d) $\omega_0 = 800$; (e) $\omega_0 = 1000$. (4% each, explain your reasons)
- 3. (20%) A certain symmetry is required for the transfer function of the filter in a vestigial sideband (VSB) transmitter.
 - (a) (10%) Describe the symmetry and give an example to explain (in detail) why it is required.
 - (b) (6%) What are the advantages of VSB modulation over single sideband (SSB) and double sideband (DSB) modulation?
 - (c) (4%) Explain why VSB is generally more popular in the transmission of TV signals than SSB and DSB?
- 4. (20%) A ternary system has the signal constellation as shown in Figure 1. Assume the signals are transmitted through an AWGN channel and the source symbols are equiprobable. Plot the decision regions for the coherent receiver and determine its average symbol error probability.



- 5. (20%) Consider the differential pulse code modulation (DPCM) system.
 - (a) (10%) Describe DPCM and discuss how it differs from conventional PCM.
 - (b) (6%) Discuss its advantages and disadvantages relative to conventional PCM.
 - (c) (4%) In what extreme cases will DPCM systems provide little advantage over conventional PCM systems?