

94 學年度中央大學通訊工程學系碩士在職專班【02】「通訊系統」考題

考試日期：中華民國 94 年 3 月 19 日星期六，上午 10：30~12：10

考試地點：中央大學通訊館一樓 E1-109 教室

考試時間：100 分鐘

試題總分：100 分

1.(20%)A filter has transfer function  $H(f) = \prod(f/2B)$  and input  $x(t) = 2W \sin c(2Wt)$ .

(a)Find the output  $y(t)$  for  $W < B$ .

(b)Find the output  $y(t)$  for  $W > B$ .

(c)In which case does the output suffer distortion? What influenced your answer?

2.(20%)Five messages bandlimited to  $W, W, 2W, 4W$ , and  $4W$  Hz, respectively, are to be time-division multiplexed. Devise a commutator configuration such that each signal is periodically sampled at its own minimum rate and the samples are properly interlaced. What is the minimum transmission bandwidth required for this TDM signal?

3.(20%)Compare bandwidth requirements for noncoherent ASK and FSK and for DPSK for the following data rates  $R$ . Use null-to-null RF bandwidths. Assume that the FSK "tones"

must be separated by  $2/T$  Hz.

(a)  $R=10\text{kbps}$

(d)  $R=500\text{kbps}$

(b)  $R=50\text{kbps}$

(e)  $R=1\text{Mbps}$

(c)  $R=100\text{kbps}$

4.(20%)An MSK system has a carrier frequency of 100MHz and transmits data at a rate of 100kbps.

(a)For the data sequence 1010101010..., what is the instantaneous frequency?

(b)For the data sequence 000000000..., what is the instantaneous frequency?

5.(20%)A parity-check code has the parity-check matrix

$$[H] = \begin{bmatrix} 1101100 \\ 1110010 \\ 0111001 \end{bmatrix}$$

Determine the generator matrix and find all possible codewords.