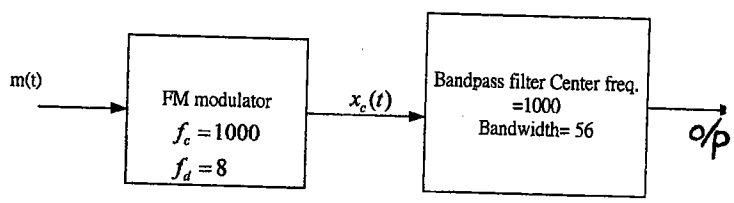
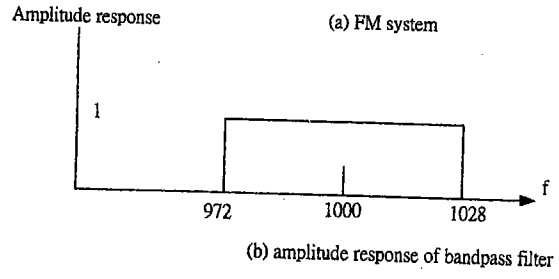
大葉大學 九十三 學年度 研究所碩士班 招生考試試題紙					
系 所 別	組 別	考 試 科 目 (中文名稱)	考試 日期	節 次	備 註
電信工程學系碩士班	乙	通訊原理	3月28日	第 三 節	共二頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶） 13:30 ~ 15:00

1. (15%) Considering an FM modulator, as shown in Fig. 1 (a), operates with $f_d = 8$, the input message signal $m(t) = 5\cos 2\pi(8)t$, and the output is $x_c(t) = 100\cos[2\pi(1000)t + \phi(t)]$. The modulator is followed by a band-pass filter and with a center frequency of 1000 Hz and a bandwidth of 56 Hz, as shown in Fig. 1 (b). (A). Determine the single-sided spectrum of modulator output, and (B). Find the power at the filter output.



(a) FM system



(b) amplitude response of bandpass filter

Fig. 1

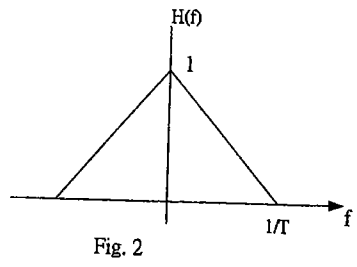


Fig. 2

2. (15%) An ideal lowpass filter with the impulse response $h_o(t) = \dfrac{\sin(t-20)}{t-10}$. Since the system is causal, the actually response is $h(t) = \begin{cases} h_o(t), & t>0 \\ 0, & t<0 \end{cases}$. (A). Find H(f), and compare it to the system function of the ideal filter. (B). Find the output when the input is $m(t) = \sin(t)/t$. (C). Find the error (difference between output and input) for the input of part (B).

3. (20%) Assuming that there is a communication channel with triangular passband characteristic, as shown in Fig. 2. Determine the peak and mean square intersymbol interference (ISI) for a signal resulting from sending ideal impulse samples through the channel described in Fig. 2.

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4. (20%) What is the information that you can illustrates from the curves as shown in Fig. 3.

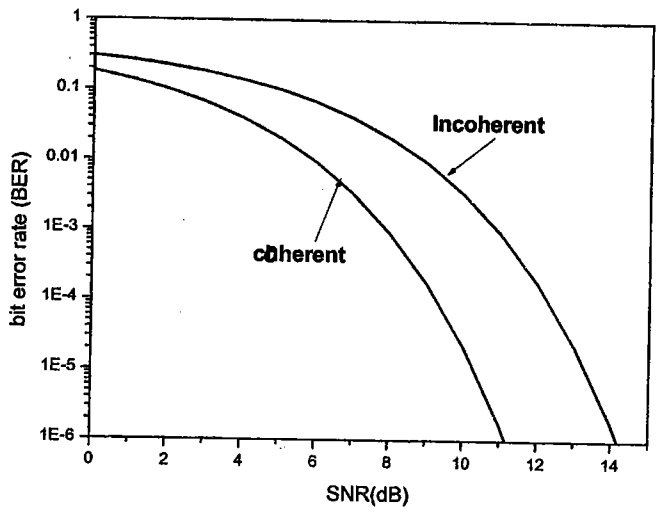

Fig. 3

5. (20%) When a random signal $S(t)$ is defined as $S(t) = K_a + \exp(-K_b|t|)$, where K_a and K_b are independent uniform random variables on [-1,1] and [0,2], respectively.
   (A). Draw a few sample functions of the process.
   (B). Determine the E[$S(t)$].
   (C). Determine $R_{SS}(t_1, t_2)$.
   (D). What's the normalized power of $S(t)$.

6. (10%) As shown in Fig. 4 is a convolutional encoder (rate 1/2, constrain length K=3), determine the output sequence sequentially.

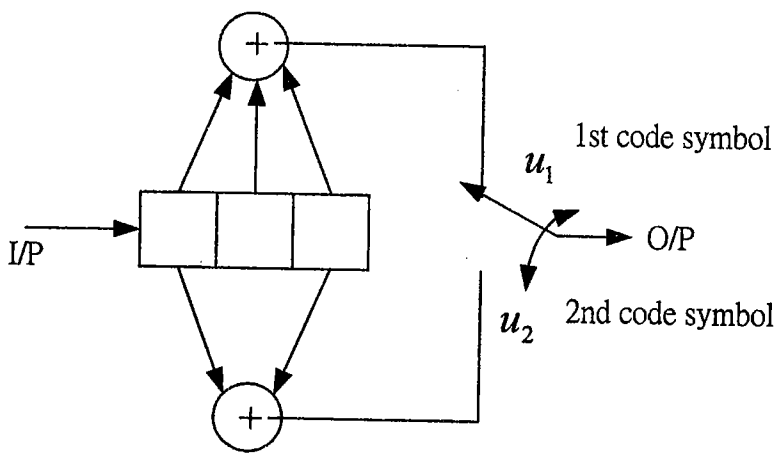

Fig. 4