淡江大學九十一學年度碩士班招生考試試題

系別：電機工程學系　　科目：通 信 系 統

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計算機	字典
X	X

1. Find a cascade and parallel realization of

$$H(z) = \frac{(1-z^{-1})^3}{(1-\frac{1}{2}z^{-1})(1-\frac{1}{8}z^{-1})}$$

with basic first-order filter as shown in Fig.1

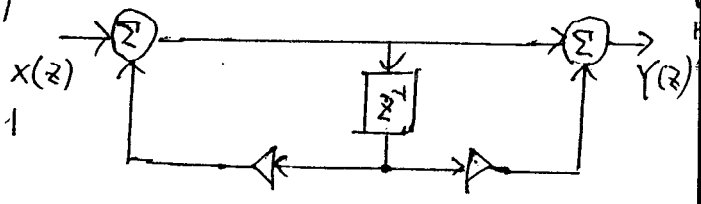

Fig.1

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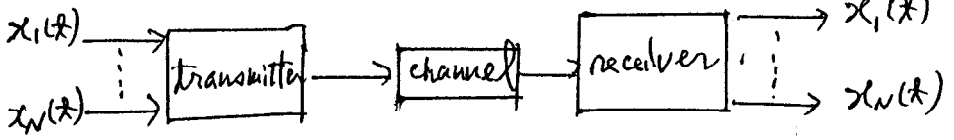
2. The purpose is to send N signals $x_1(t), x_2(t), \cdots, x_N(t)$ from one point to another. To keep the cost of the communication process as small as possible, it is desirable to be able to send the signals through the same channel (e.g. wire cable or optical-fiber cable) at the same time. The process is called multiplexing. Explain and plot the following transmitter and receiver of the process with frequency-division multiplexing and time-division multiplexing, respectively.



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3. In addition to amplitude modulation, a signal $x(t)$ can be "put on" a sinusoidal carrier by modulating the angle of the carrier. If $x(t) = \alpha \cos w_x(t)$, K_p and K_f are phase and frequency sensitivity, respectively, and w_c is the carrier frequency. Then, find the modulated carrier $S(t)$ in phase and frequency modulation transmission, respectively.

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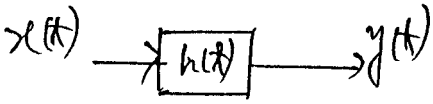
4. Derive the convolution integral representation of Linear time-invariant system and explain why the system must be linear and time-invariant.



where h(t) is the impulse response of the system.

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5. Find the Fourier transfom of the following signal

(a) $x[n] = \cos \omega_0 n$ with $\omega_0 = \frac{2\pi}{5}$, n is integer.

(b) $x[n] = \sum_{k=-\infty}^{\infty} \delta[n - kN]$ with period N