

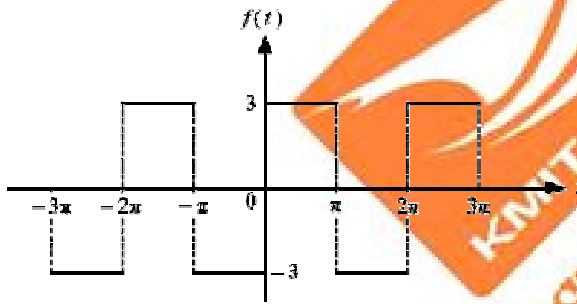
國立金門技術學院

97 學年度電資研究所碩士班（電子組）考試試題

通訊原理

問答題

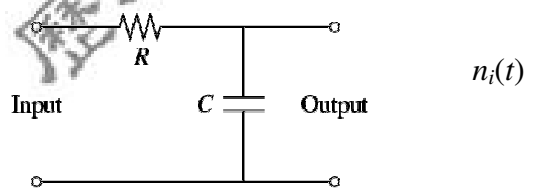
1. Consider the periodic signal $f(t)$ with period $T_0 = 2\pi$ as follows. Find the complex exponential Fourier series.



2. An AM modulator has output
 $x_c(t) = 40 \cos 2\pi(200)t + 4 \cos 2\pi(180)t + 4 \cos 2\pi(220)t$
 Find (1) Modulation index (2) Efficiency.

3. The input to the lowpass RC filter is
 $x_i(t) = A \cos(2\pi f_c t)$ plus white Gaussian noise
 with the power spectral density (PSD)

$$S_{n_i}(f) = \frac{1}{2} N_0, \quad -\infty < f < \infty$$



- (1) Find the transfer function of the RC circuit, $H(f)$.
 (2) Find the power spectral density (PSD) of the noise component $n_o(t)$ at the filter output, $S_{n_o}(f)$.

- (3) Find the average power of the signal component $x_o(t)$ at the filter output.

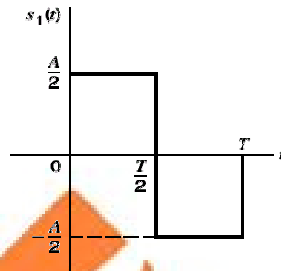
4. A source has five outputs denoted $[m_1, m_2, m_3, m_4, m_5]$ with respective probabilities $[0.40, 0.19, 0.16, 0.15, 0.10]$. Find

- (1) the codewords to represent the source outputs using Huffman encoding.

(2) the average wordlengths \bar{L} .

5. Consider the signal $S_1(t)$ shown in the following figure.

- (1) Determine the impulse response of a filter matched to this signal.
- (2) Find the peak value of the filter output.



(a)

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