

Communication Theory
EC5.203 - Spring 2023

Exam: Quiz 2
Total Marks: 30

Date: 03 March 2023
Time: 08:30 to 09:15

Instructions:

- Answer all the questions.
 - Use of the calculator is allowed.
 - Clearly state the assumptions (*if any*) made that are not specified in the question.
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1. The input signal to PLL and its VCO output signal are $5 \sin(2\pi 1000t + \pi/4)$ and $5 \cos(2\pi 1200t)$, respectively. The loop filter is first order with transfer function $\frac{2}{s}$ and the VCO constant is $c = 1$. Determine the phase error at the output of comparator as $t \rightarrow \infty$. [6]
 2. Consider a signal of bandwidth $B_M = 10$ KHz and peak-to-peak amplitude $m_p = 10$. If the signal sampled at 1.5 times the Nyquist rate, then determine the minimum channel bandwidth when the desired SNR is equal to 10 dB for uniform and non-uniform (for $\mu = 100$) quantizers. [6]
 3. Derive the quantization noise power and the SNR for the case of uniform quantization. [8]
 4. Explain the impact of noise on FM and PM signals and how it can be mitigated in FM case. [10]
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