

TDAV engleza 14.01.2013

1. Structure of digital processing chain for sound signal (analog to digital transition). Find the alias frequencies, if the Nyquist condition is not fulfilled, for an input signal with two components at $f_1 = 26\text{kHz}$ and $f_2 = 32\text{kHz}$, if $f_s = 48\text{kHz}$
2. Present briefly the main equations of magnetic recording/playback. Draw the playback characteristics.
3. Describe briefly focusing and tracking in three beam CD systems. Find out the optimal value of the pit depth in an optical recording system, using phase annihilation, if $\lambda = 700\text{nm}$, and $n = 1,5$.
4. Describe briefly the two data encoding steps for CD systems. Short discussion.
5. Define shortly the difference between the two main digitization modes for video. Compute the sampling frequency for a HDTV standard with following parameters : $f_v = 60\text{Hz}$, $N_{\text{lines}} = 1125$ and 2200 samples/line , interlaced (2:1)
6. Present the sub-streams and calculate the averaged binary rate resulting from a component digitization of a SDTV video signal (10 bit/sample) for a video signal (4:2:2). If the additional rate corresponding to audio information is 1.4Mbps, calculate the necessary bandwidth to transmit the full (uncompressed) information (audio+video). Use Shannon's theorem $C = B \cdot \log_2(1 + S/N)$ and $S/N = 40\text{dB!!!}$ (*)
7. Describe the principle and equations of digital to analog converter with translation of the input code. Find the dimension of the RGB translation memory (number of memory locations x word length) necessary to implement a translation D/A converter with the following characteristics: each RGB converter resolution – 12 bit, input pixel encoding – 10 bit
8. Helical exploration performances. Maximum recorded frequency. Head/tape speed. Necessary speed. Which is the relative speed head/tape for a rotary head with 2 heads, drum diameter $D = 60\text{mm}$, with non-segmented recording (one frame/track), in European PAL standard (*)