



Final exam topics
Telecommunication – Technical Management BSc

1. Classification of signals according their domain and range (continuous, discrete, analog, digital). Deterministic and stochastic (random) signals. Time domain features of signals: peak and RMS value, crest factor. The decibel scale, signal to noise ratio.
2. Properties of linear systems (superposition, eigen functions). Fourier expansion of periodic signals (orthogonality relations, real and complex form of Fourier series). Power of compound signals.
3. Spectral analysis: Fourier transform. Spectral behavior of square pulse and unit (Dirac) pulse, relation between pulse width and bandwidth. System description functions: pulse and frequency response. Energy spectrum and power density function of random signals.
4. Acoustics: Frequency range of audible signals. Physical measures of sound (sound pressure level and sound intensity level, acoustic dB). Psycho-physical measure of sound (Fletcher curves, loudness level and son-scale). Threshold of hearing, pain limit, masking effects. Colorimetry: Capability of human eye (visible spectrum, resolution, sensibility). Explanation of color vision. The RGB and XYZ system, luminosity. The x - y color gamut (dominant wavelength, excitation purity)
5. Amplitude modulation: Time domain function, spectrum and bandwidth of AM-DSB, AM-DSB/SC and AM-SSB signals (carrier frequency, modulating signal, modulation index). Demodulation of AM signals.
6. Angle modulation: Time domain description of angle modulated signals (carrier frequency, modulation content, momentary frequency, phase and frequency deviation). Relation of modulation content and modulating signal in case of PM and FM. Generation and demodulation of angle modulated signals. Bandwidth of angle modulated signals.
7. Digital analog conversion. Sampling: The spectrum of the sampled signal and the Shannon-law for sampling frequency. Aliasing. Signal reconstruction from samples and the effect of leaking. Quantization: Quantization step and peak clipping. Quantization error and quantization noise. Linear and logarithmic quantizers.



8. Baseband digital transmission methods: PAM, PWM, PPM. The block diagram of PAM transmission. Eye pattern, the effect of intersymbol interference (ISI), the effect of noise. The condition of ISI-free transmission. Signaling speed and bit rate.
9. Digital carrier systems. Features of ASK, OOK, FSK and PSK modulation methods. Constellation diagram of PSK signals. QAM method: mathematical description, modulation and demodulation, constellation diagram and 2D eye pattern of QAM signals. Number of bits transmitted during a signaling slot.

