**Questions – Satellite technologies and services Exam**

1. Significant historical events in the development of satellite communications systems,
2. Describe the satellite communication system, components of the satellite communication system (user, control station, ..).
3. Radio frequency spectrum, frequency bands for satellite communications, properties
4. Propagation of the microwaves (graph - course of the attenuation in satellite channels in dependence on the frequency (the effect of atmospheric attenuation)
5. Kepler's laws and their application in satellite communications
6. Explain the time difference between the solar day and the sidereal day?
7. The parameters for defining of the orbital path (min. 6 parameters).
8. Division of the sat. com. system by the height of the orbit (GEO, MEO, LEO, HEO), write the characteristic values ​​of the orbital velocities of the various systems in km /s., In what heights Van Allen belts are, and why are they dangerous for satellites?
9. Satellite - cosmic element, description of the platform and the payload, for example from the IRIDIUM satellite system, ways of stabilizing of the satellite
10. The definition of power flux-density PDF., Definition of EIRP, Regulatory authority.
11. Satellite subsystems, TTCM - functions for telemetry, tracking and control., Power subsystems, eclipse and the operation of the satellite during eclipse.
12. Types of antennas for mobile satellite communication systems (dipole, crossed dipole (turnstile), helical, patch, antenna arrays (smart antennas, array antennas)
13. Received power. The energy balance of the satellite link, C/N, C/N0
14. Aperture antenna, gain, beam width, the effective area of the antenna.
15. Noise figure and noise temperature (relations, derivation).
16. Noise model of the satellite receiver, determination of the noise temperature in the reference points.
17. Description of GPS navigation messages
18. C/A code, M-sequence, Gold's sequence, properties..
19. Signal structure (block diagram of the GPS transmitter).
20. ErrorSources - sources of error for GPS; Explain the concept of selective availability.
21. Overview of GPS - basic characteristics, describe the GPS segments.
22. Describe FDMA (intermodulations), explain the concept of input back-off.
23. Describe TDMA, description of TDM frames (frame length, header, payload), the timing, the difference between TDM and TDMA
24. Describe CDMA (the principle, spreading and de-spreading of the signal).
25. Why do we use modulation, which modulations are the most commonly used in satellite communications, digital modulation, the advantages of digital transmission system.
26. Phase Shift Keying (PSK) and quadrature PSK (QPSK). Explain the principle of PSK and QPSK modulator, line codes, characteristic spectra (rectangular, (sin x) / x and triangular pulse).
27. Explain the concept of Intersymbol interference (ISI). How can it be suppressed?
28. Explain the principle of the Nyquist filter and how it's implemented in a communication system (Matched filter (- adapted filter), roll-off factor)?
29. The required bandwidth for transmission (baseband, passband) - for a digital signal with bit rate Rb, example.
30. Bit error rate (BER): quality parameter of modulation schemes, the relationship between Eb/N0 and  C/N0, the BER for BPSK, BER for QPSK, Shannon limit.
31. VSAT system, describe the access methods (FDMA, MF, TDMA)., How is the inbound and outbound created?
32. STAR-VSAT and MESH VSAT topology, advantages, disadvantages, areas of application.
33. The use of satellites for transmission of television programs, trade, business and education, block diagram for the satellite transmitter, explain the concept of FEC
34. Draw a block diagram of a satellite receiver, explain the function of an outdoor unit.
35. Draw a diagram of satellite receiver. Explain the meaning of internal and external decoder.
36. Explain the concept of energy dispersion and method of its implementation for analog and digital television.
37. What protocol is used for communication between the internal and the external unit of the satellite receiver (DiSEqC).
38. Describe the circuit solution to the current satellite receiver and its technical implementation using circuits FPGA, Dreambox DM 8000 H
39. How to calculate the elevation and azimuth for adjusting of the satellite dish of a selected satellite? How is the satellite visibility test determined (Lecture 2)?
40. Satellite AMOS 2.3, Magiosat, DVB-S2
41. Organization of the MPEG-2 multiplex (program stream, transport stream), composition of the MPEG-2 transport packet,
42. The organization of the transport multiplex: MPEG-2 tables (PAT, PMT, CAT, Private tables), the main DVB-SI tables (NIT, SDT, EIT, TDT)
43. Scrambling and conditional access, simulcrypt, multicrypt, major systems of the conditional access
44. Principles scrambling system in the DVB standard, mechanisms of conditional access (CAMs, ECMs, EMMs)