Thematic Topics for the Master Final State Exam

Master study program Electronics and Communication

Common Theoretical Part

1. Random Access Media Protocols in Wireless Networks, Network Topology and Data Transfer in Bluetooth, Routing in Wireless Sensor Networks, RFID Principle, Communication Principles in WiFi Networks, MQTT, LoRa, SigFox, IQRF, Communication Chain for IoT Service Operation, Reliability and security of wireless and sensor networks

Thematic Areas

Branch Communication Systems and Networks

1. NGA access networks, topology and access network architectures.
2. Modeling of telecommunication line parameters.
3. Types of Digital Subscriber Lines.
4. Optical access networks, passive optical networks, use of wavelength multiplexing, access network dimensioning, line attenuation balance.
5. Principle of IP packet routing, principle of distributed routing algorithms.
6. The principle of IP multicast routing. Network architecture using IPv6 protocol.
7. Transport protocols (TCP, UDP, SCTP) and their use.
8. Flow control and network overload protection, active packet queue management.
9. MPLS network architectures, services provided by MPLS.
10. Software-defined Networks (SDNs) and their use.
11. Network functions virtualization, HW and SW architecture of networking elements.
12. Definition, classification and basic properties (energy, spectral) of digital modulations.
13. Models of communication channels. Demodulator, metrics (correlation and signal space, SODEM).
14. Communication Channel Sharing, Principles of block, convolution and TCM codes. Decoding (symbol, sequence, MAP, ML). Viterbi algorithm.
15. Decoder error rate (union bound, pairwise error probability).
16. Digital switching system, switching matrix.
17. Switching system control, signaling in switching systems (CAS and CCS), SS7 signaling - message routing, signaling protocols, Intelligent networks, IP telephony, quality and its assurance and evaluation, IMS systems, H.323 signaling protocols, SIP / SDP, RTP / RTCP communication protocol, mobile network voice communication - VoLTE.
18. Optical amplifiers (Raman, EDFA, SOA), wavelength converters and optical signal regeneration (1R, 2R, 3R), optical filters, optical switches and their use.
19. Optical systems with wavelength multiplexing (attenuation, noise, nonlinear and dispersion balances), Optical coherent systems and high order modulations (optical systems with 100 Gbit/s and higher), optical networks and architectures, circuit switching principles, packet and burst switching, optical networking elements, optical data interfaces.