

State doctoral exam topics

ELECTRICAL ENGINEERING AND COMMUNICATIONS

Section Telecommunication Engineering

1. Design Methods of Digital Filters

1D and 2D filters, numerical methods for design of digital filters, analytical methods for design of digital filters.

2. Transformations in Image and Video Compression

Transformations in standards for compression of digital images (JPEG, JPEG2000), transformations in standards for video compression (H.264 standard).

3. Optical Communication Systems

Basic functional principles of optical coherent transmission systems, high speed optical modulation formats and practical deployment, transmission systems using multicore (MCF) and few mode (FMF) fibers.

4. Optical Networks and Architectures

Routing and wavelength assignment algorithms, ROADM node architectures for reconfigurable and elastic optical networks, all-optical regeneration and amplification, optical burst switched networks.

5. Networks and Reliability

Topologies and architectures of networks, graph theory for network sizing, algorithms over graphs, sizing of edges and nodes, reliability of communication networks, methods of increasing reliability, information security.

6. Queuing Theory

Classification of service systems, mathematical description, waiting and lost serving systems, application of queueing theory, queueing mechanisms, quality of service parameters.

7. Architectures of Mobile Networks

Architecture and key building blocks of modern mobile networks, cloud-based architecture of mobile networks (C-RAN, MEC) and allocation of control resources, architectures for future mobile networks (slicing, drones, satellites).

8. Communication and Management of Mobile Networks

Voice transmission, data transmission, random access procedure, scheduling of radio resources, interference management and mitigation, mobility management, advanced methods for radio resource and mobility management, device-to-device communication, machine type communication and communication of IoT devices.

Elective Thematic Area (all sections)

Selection of a specific area should be based on the supervisor's recommendation, it should be related to the dissertation topic and concern the problems having been studied by the student from current scientific literature. The topic should be quoted in the application for the State Doctoral Examination.