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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Autonomous
Educational institution of higher education
"NORTH CAUCASUS FEDERAL UNIVERSITY"

APPROVED BY
Acting Director of the Institute
of Advanced Engineering
Cand. Tech. Sci., Associate Professor
Porokhnya A.A.

PROGRAM OF THE STATE EXAM

Field of study	11.03.02 Infocommunication Technologies and Communication Systems
Profile	Intelligent Data Processing in Infocommunication Systems and Networks
Year of start of training	2026
Form of study	Full-time
Implemented in a semester	8

DEVELOPED BY:

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Systems and Electronics, Institute of Advanced Engineering
Dr. Tech. Sci., Professor
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1. OBJECTIVES OF THE STATE EXAM

The purpose of the state exam is to assess the degree of professional training of a graduate in the use of theoretical knowledge, practical skills and abilities, the level of competence formation to solve professional problems at the level required by the federal state educational standard of higher education in the field of training 11.03.02 Infocommunication Technologies and Communication Systems (bachelor's level).

The main task of the state exam is to identify the ability of students to solve theoretical and practical problems at an interdisciplinary level.

Objectives of the state exam:

- determination of the level of theoretical and practical training of graduates;
- determination of their readiness for professional activities in the field of information and communication technologies and communication systems;
- determination of the ability of graduates to improve the efficiency of the functioning of information and communication devices;
- determining the ability to transform the acquired knowledge into appropriate solutions for the implementation of information and communication networks and systems;
- identification of shortcomings in the training of bachelors in order to further improve the educational process at the department;
- orientation of graduates of the department to the final stage of training - writing and defending the final qualification work.

2. LIST OF COMPETENCIES, THE LEVEL OF FORMATION OF WHICH MUST BE CHECKED AT THE STATE EXAM

2.1. Name of competencies

Index	Content of competence
UK-(No)	Universal Competencies
UK-1	Is able to search, critically analyze and synthesize information, apply a systematic approach to solving problems.
UK-2	Is able to determine the range of tasks within the framework of the goal and choose the best ways to solve them, based on the current legal norms, available resources and restrictions.
UK-3	Is able to carry out social interaction and fulfill his role in a team.
UK-4	Is able to carry out business communication in oral and written forms in the state language of the Russian Federation and foreign language(s).
UK-5	Is able to perceive the intercultural diversity of society in socio-historical, ethical and philosophical contexts.
UK-6	Is able to manage his time, build and implement a trajectory of self-development based on the principles of lifelong learning.
UK-7	Is able to maintain the proper level of physical fitness to ensure full social and professional activities
UK-8	Is able to create and maintain safe living conditions, including in the event of emergencies.
UK-9	Is able to make informed economic decisions in various areas of life
UK-10	Is able to form an intolerant attitude towards corrupt behavior

Index	Content of competence
OPK-(No)	General professional competencies
OPK-1	Is able to use the provisions, laws and methods of natural sciences and mathematics to solve problems of engineering activities.
OPK-2	Is able to independently conduct experimental research and use the basic methods of processing and presenting the data obtained.
OPK-3	Is able to apply methods of searching, storing, processing, analyzing and presenting information from various sources and databases in the required format, while observing the basic requirements of information security.
OPK-4	Is able to understand the principles of modern information technologies and use them to solve the problems of professional activity.
OPK-5	Is able to develop algorithms and computer programs suitable for practical application.
PK-(No)	Professional competencies
	Project activities
PK-1	Is capable of developing switching subsystems and network platforms, data transmission networks, transport networks and radio access networks, satellite communication systems.
PK-2	Is able to apply modern theoretical and experimental research methods in order to create new promising means of infocommunications, use and implementation of research results
PK-3	Is able to carry out calculations on the design of networks, structures and infocommunication tools in accordance with the terms of reference using both standard methods, techniques and design automation tools, and independently created original programs
PK-4	Is able to prepare standard technical projects and primary control of compliance of developed projects and technical documentation for various information and communication facilities with national and international standards and technical regulations
	Technological activities
PC -5	Is able to carry out installation, configuration, adjustment, testing of equipment, development of operating modes, control of design parameters of operation and testing of communication equipment, ensuring compliance of technical parameters of information and communication systems and / or their components with established operational and technical standards
PC -6	Is able to administer network subsystems of infocommunication systems and/or their components
PC -7	Is capable of administering remote access security tools (operating systems and specialized protocols)
PC -8	Is capable of performing routine maintenance on network devices and information and communication system software

3. STRUCTURE OF THE STATE EXAM

The state exam in the field of training 11.03.02 Infocommunication Technologies and Communication Systems includes the topics of the following disciplines:

1. Computer Communications and Networking.
2. Digital Circuit and Logic Design.
3. Object-Oriented Programming.

The state exam is conducted on the basis of tickets drawn up in accordance with the exam program.

The exam ticket includes two questions and two tasks. The first and second questions are to test knowledge for the basic level of training. The first task is to test skills, mastery of the material and practical skills for the basic level of training. The second task is to test skills, mastery of the material and practical skills for an advanced level of training.

4. CONTENT OF THE STATE EXAMINATION

List of topics submitted for the exam: **Computer Communications and Networking.**

Networking Overview. Open Systems Interoperability Reference Model. Information Switching Principles. Ethernet Technology. Ethernet Physical Media. Fast Ethernet Technology (IEEE 802.3u). Gigabit Ethernet Technology. FDDI Technology. Structured Cabling System. Bridge Operating Principles. LAN Switches. Wireless LANs. Network Interconnection Principles Based on Network Layer Protocols. Routing Protocols. X.25 Networks. ISDN Technology - Integrated Services Networks. Frame Relay Technology. ATM Technology. LAN Design. VLAN Scaling. STP Protocol. EtherChannel and HSRP. WAN Concepts. Branch Network Design. Access Control Lists. Quality of Service. Network Evolution.

Digital Circuit and Logic Design.

Basic technical indicators and characteristics of analog radio-electronic devices. Principles of amplification of electrical signals. Principles of amplifier construction. Feedback in amplifiers. Typical amplification stages. Amplification stages with correction. Power amplifiers. Multistage amplifiers. Op-amps. Functional circuits based on op-amps. Active RC filters on op-amps. Signal generators. Analog electronic devices on integrated circuits. Basic concepts of digital circuitry. Logic elements and their application. Combination devices: adders, decoders, encoders, multiplexers, code comparators. Triggers. Registers. Counters. Memory devices. Digital-to-analog and analog-to-digital converters.

Object-Oriented Programming

Theoretical and practical training that provides knowledge of the basics of object-oriented programming. Obtaining practical skills in the development of object-oriented programs. Obtaining skills in using standard techniques when composing and debugging object-oriented programs on personal computers. Obtaining skills in using an object-oriented approach to solving. Objectives of the discipline: training a specialist who is confident in the capabilities provided by modern computer technologies, teaching students object-oriented programming, forming programming skills using object-oriented technologies. Teaching students to work in a programming environment.

5. LIST OF SAMPLE QUESTIONS TO PREPARE FOR THE STATE EXAM

Computer Communications and Networking.

Questions to check the level of learning

1. Fundamentals of network technologies: telecommunication network, circuit and packet switching, data flows, NGN networks, addressing.
2. Functions of EMVOS model levels.
3. Data encapsulation in the TCP/IP model.
4. Ethernet LANs.
5. Switches in local networks: algorithm of operation, switching modes.
6. ARP protocol.
7. VLANs.
8. The STP protocol.
9. IPv4 protocol: essence, packet structure.
10. IPv6 protocol: essence, packet structure.
11. Network IPv4 addresses.
12. Network IPv6 addresses.
13. Routers in network technologies. Routing principles.
14. RIP routing protocol.
15. OSPF routing protocol.
16. WAN Access Option: Private WAN Infrastructure, Advantages and Disadvantages.
17. WAN Access Option: Public WAN infrastructures, advantages and disadvantages.
18. ISDN technology.
19. Frame Relay technology.
20. ATM technology.

Digital Circuit and Logic Design.

Questions to check the level of learning

1. Technical indicators and characteristics of the amplifier.
2. Principles of amplification of the electrical signal. Typical amplifier diagram.
3. Feedback in amplifiers.
4. Amplifying stage with a common emitter (with a common source).
5. Amplifying stages with a common base (gate) and with a common collector (drain).
6. Methods of increasing the gain factor. Low-frequency and high-frequency gain correction.
7. General information, parameters, characteristics, and equivalent op-amp diagram.
8. Circuits for switching on op-amps. Static errors of op-amps.
9. Voltage combiners, differentiators, and op-amp integrators.
10. Conditions and modes of self-excitation of generators. Generators with resonant circuits.
11. Basic logic gates: inverters; repeaters and buffers, AND, AND-NOT, OR, OR-not, Exclusive OR.
12. Combination schemes: decoders and encoders.
13. Combination circuits: multiplexers and adders.
14. Basics of construction and classification of triggers. Principle of operation of typical RS triggers, JK triggers and D-triggers.
15. Parallel registers triggered by the edge and by level, their application schemes.
16. Shift registers and schemes of their application.
17. Asynchronous counters and their application schemes.
18. Synchronous meters and their application schemes.
19. Read-only storage devices. Firmware machines on ROM.
20. RAM devices as an information buffer.

Object-Oriented Programming

Questions to check the level of learning.

1. What is the object-oriented approach and how does it differ from the procedural approach in programming?
2. What are the basic principles of the object-oriented approach?
3. What are the advantages of the object-oriented approach compared to other approaches in programming?
4. What is a class in object-oriented programming and how is it used?
5. What are the basic principles of inheritance in object-oriented programming?
6. What is polymorphism in object-oriented programming and how is it used?
7. What are the main types of relations between objects in object-oriented programming?
8. What constructs in object-oriented programming are used to provide encapsulation?
9. How can the object-oriented approach be used in various fields other than programming?
10. What are the disadvantages and limitations of the object-oriented approach to programming and how can they be overcome?
11. What principle of the object-oriented approach describes the ability of objects of different classes to have the same methods with the same names but with different implementations?
 - a) Encapsulation
 - 2) Inheritance
 - 3) Polymorphism
 - 4) abstraction
12. Which of the following constructs provide encapsulation in object-oriented programming?
 - a) Classes and objects
 - 2) Variables and Methods
 - 3) abstract classes and interfaces
 - 4) Keywords: public, private, protected
13. What is the principle of the object-oriented approach that describes the ability of classes to inherit the properties and methods of other classes?
 - a) Encapsulation
 - 2) Inheritance
 - 3) Polymorphism
 - 4) abstraction
14. Which of the following constructs provide polymorphism in object-oriented programming?
 - a) Classes and objects
 - 2) Variables and Methods
 - 3) abstract classes and interfaces
 - 4) Keywords: public, private, protected
- Answer: 3
15. What is a constructor in object-oriented programming?
 - a) A method that is called automatically when a class object is created
 - 2) A method that allows you to change the values of class variables
 - 3) A method that allows you to obtain the values of class variables
 - 4) A method that performs a certain function when called
- Answer: a
16. Which of the following constructions are used to describe interfaces in object-oriented programming?
 - a) Classes and objects
 - 2) Variables and Methods
 - 3) abstract classes and interfaces
 - 4) Keywords: public, private, protected

Tasks to check the level of learning

Computer Communications and Networking.

Configure the SSH protocol (file name 2.2.1.4 Packet Tracer - Configuring SSH.pka).

1. Configure the Switch Port Security function (file name 2.2.4.9 Packet Tracer - Configuring Switch Port Security.pka).
2. Troubleshoot switch port security (file name 2.2.4.10 Packet Tracer - Troubleshooting Switch Port Security.pka).
3. Troubleshoot the VLAN implementation. Option No1 (file name 3.2.4.7 Packet Tracer - Troubleshooting a VLAN Implementation - Scenario 1.pka).
4. Troubleshoot the VLAN implementation. Option No2 (file name 3.2.4.8 Packet Tracer - Troubleshooting a VLAN Implementation - Scenario 2.pka).
5. Configure the router interfaces. (file name 1.1.3.5 Packet Tracer - Configuring IPv4 and IPv6 Interfaces.pka).
6. Create and test a straight, unshielded "unshielded twisted pair" cable for an Ethernet network (T568A standard).
7. Create and test a crossed unshielded "unshielded twisted pair" cable for an Ethernet network (T568V standard).
8. Set a password on the control console and log in to privileged mode.
9. Set the enable secret password on the Cisco router.

Digital Circuit and Logic Design.

1. Determine the number of identical stages of a multi-channel amplifier that provides a power gain of at least 1000 (in times), if one stage has a voltage gain of 26 dB and a current gain of 20 dB.
2. Determine the voltage gain of the first stage of a three-stage amplifier (in decibels and times) if the total gain is 80 dB, and the gain of the second stage is 6 dB more than the gain of the third stage, which is equal to 10 relative units (times).
3. Using the values of the measuring instruments in the diagram shown (see Fig. 1), determine the gain factors in terms of voltage, current, power and through-gain.

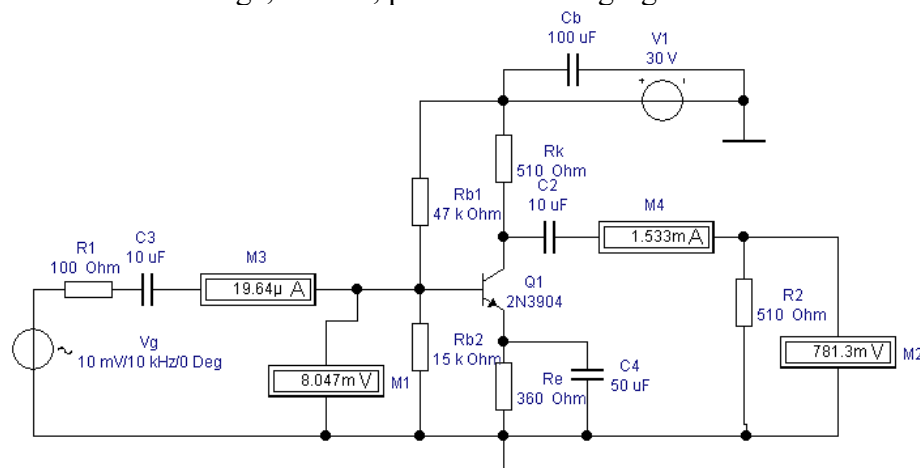


Fig. 1

4. Determine the type of amplifier and the purpose of all resistors and capacitors that are part of it (see Fig. 1).
5. To conduct a comparative analysis of amplifier stages with various bipolar transistor switching circuits, while revealing their advantages and disadvantages, indicating the scope of application.
6. Draw up and explain the operation of the LED indication control circuit on a logic inverter. Calculate the value of the resistance limiting the current through the LED, provided that the value of

the current consumption of the LED should be at least 10 mA, but not more than 100 mA, and the voltage drop on the LED is 1 V.

7. Present a symbol, jump table, and time diagrams of a synchronous single-stage D trigger with dynamic write control and asynchronous preset inputs.

8. Make a diagram of a controlled inverter on the logic element "Exclusive OR", explain the principle of operation of a controlled inverter using a time diagram.

9. Draw up a diagram of a single-digit complete adder, explain its principles of construction and operation.

10. To substantiate the choice of the necessary microcircuits (element base) for the construction of a 16-bit accumulating adder from the provided list of microcircuits: K555AP6, K555IV2, K555ID6, K555IE17, K555IM6, K555IR9, K555IR35, K555KP17, K555LR13, K555TM8.

Object-Oriented Programming

1. What is method overloading in object-oriented programming?
 - a) The ability of classes to inherit the properties and methods of other classes
 - 2) The ability of classes to have multiple
 - 3) The ability of classes to create objects of other classes
 - 4) The ability of classes to change the properties and methods of other classes
2. Which of the following constructions are used to describe abstract classes in object-oriented programming?
 - 1) Classes and Objects
 - 2) Variables and Methods
 - 3) abstract classes and interfaces
 - 4) Keywords: public, private, protected
3. Which of the following statements relate to the basic principles of the object-oriented approach?
 - a) Encapsulation
 - 2) Inheritance
 - 3) Polymorphism
 - 4) Compilation
 - 5) abstraction
4. What is inheritance in object-oriented programming?
 - a) The process of creating a class object
 - 2) The ability of classes to inherit the properties and methods of other classes
 - 5) The ability of classes to have multiple methods with the same name but with different parameters
- 6) The process of converting program code to machine code
- 7) What is an interface in object-oriented programming?
 - 1) A class that cannot be used to create objects
 - 2) A method that is called automatically when a class object is created
 - 3) A class that inherits the properties and methods of other classes
 - 4) Description of the set of methods to be implemented in the class

Computer Communications and Networking

Configure switch port security. (file name 2.3.1.2 Packet Tracer - Skills Integration Challenge.pka).

1. Configuring VLANs. (file name 3.2.1.7 Packet Tracer - Configuring VLANs.pka).
2. Configuring trunk channels. (file name 3.2.2.4 Packet Tracer - Configuring Trunks.pka).
3. Setting up and verifying a small network. (file name 1.1.4.5 Packet Tracer - Configuring and Verifying a Small Network.pka).
4. Configuring static and default IPv4 routes. (file name 2.2.2.4 Packet Tracer - Configuring

IPv4 Static and Default Routes.pka).

5. Configuring static and default IPv6 routes. (file name 2.2.4.4 Packet Tracer - Configuring IPv6 Static and Default Routes.pka).

6. Configuring Floating Static Routes. (file name 2.2.5.5 Packet Tracer - Configuring Floating Static Routes.pka).

7. Troubleshooting static routes. (file name 2.3.2.3 Packet Tracer - Troubleshooting Static Routes.pka).

8. Setting up the RIPv2 protocol. (file name 3.2.1.8 Packet Tracer - Configuring RIPv2.pka).

Digital Circuit and Logic Design

1. Determine the gain of the op-amp given in Fig. 2, calculate the depth of negative feedback and the width of the gain bandwidth, provided that with broken feedback, the frequency response meter showed the following parameters: gain - 106 dB, upper cutoff frequency - 50 Hz.

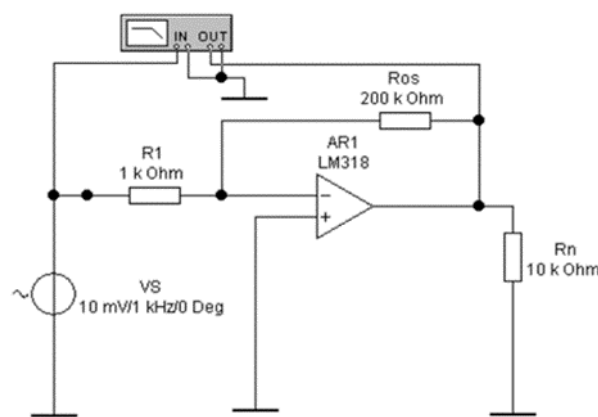


Fig. 2

2. Calculate the input impedance of the amplifier and the amplifier element (transistor) for the circuit shown in Fig. 3 using the measurement results and resistor resistance values.

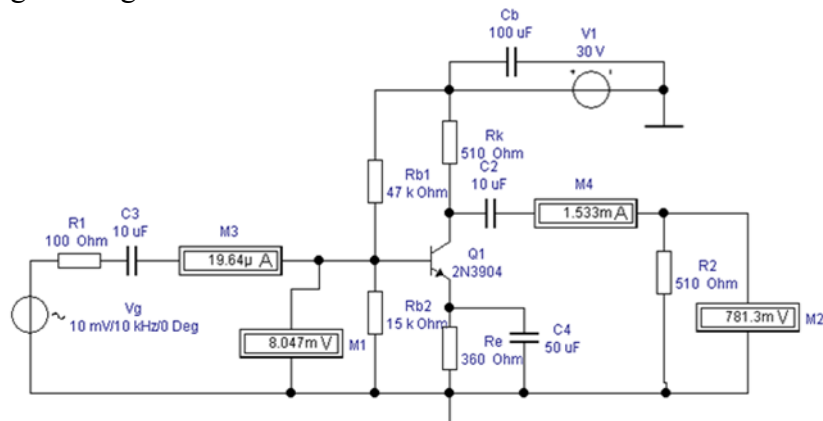


Fig. 3

3. Calculate the output impedance of the amplifier and the amplifier element (transistor) for the circuit shown in Fig. 3, using the measurement results and resistor resistance values, taking into account that the output voltage is 1.5 V in the no-load mode.

4. To develop a scheme of a controlled frequency divider on an asynchronous counter and a mulltypexor, to explain the principle of operation.

5. Submit a proposal for the technical implementation of a four-channel single-bit multiplexer based on a decoder and logic gates.

6. Simulate a counter modulo 5 based on JK triggers and test its operation in the interactive Multisim emulator or in the Electronics Workbench schematic modeling package.

7. Simulate a frequency divider by 8 based on JK triggers and test its operation in the

interactive Multisim emulator or in the Electronics Workbench schematic modeling package.

8. To develop a scheme of a 4-digit accumulating adder, to explain the principles of its construction and operation using time diagrams.

9. Make a diagram of a four-bit shift register on D triggers, explain its logic of operation using a time diagram.

10. To develop a scheme for the transmission of digital binary information in a serial code along two lines: information and synchronizing. To explain the procedure for its operation.

11. Object-Oriented Programming

1. What is encapsulation in object-oriented programming?

- a) This is the ability of an object to hide its data from other objects
- 2) It is the ability of an object to present data in the form of a graphical interface
- 3) It is the ability of an object to store its data in a database

2. What is an abstract class in Python?

- a) A class that implements all methods
- 2) A class that only has methods, but no implementation for them
- 3) A class that has no methods

3) How can I create an instance of a class in Python?

- 1) Using the `__init__()` function
- 2) Using the `new` keyword
- 3) By calling the class name and parentheses

3. Which of the following operators is used to define a class in Python?

- a) `def`
- 2) `class`
- 3) `var`
- 4) `__init__`

4. How do I create a class object in Python?

- a) Using the `def` operator
- 2) Using the `class` operator
- 3) By calling the class name, e.g. `obj = MyClass()`
- 4) You can't create a class object in Python

5. What is a constructor in Python?

- a) A function that is called when a class object is created
- 2) A function that is called when an object of the class is destroyed
- 3) A function that executes when a class is initialized
- 4) A function that performs a given action in response to a certain event

6. How do I add a new method to an existing class in Python?

- 1) Change the code of the original class definition
- 2) Use the `extend` operator
- 3) Use the `def` operator
- 4) You can't add a new method to an existing class

7. What is class inheritance in Python?

- a) The process of creating a new class based on an existing class
- 2) The process of creating a new object based on an existing object
- 3) The process of creating a new variable based on an existing variable
- 4) The process of creating a new feature based on an existing feature

8. Which of the following access modifiers in Python means that a class member is only available inside the class itself?

- a) `public`
- 2) `protected`
- 3) `Private`

- 4) lo3al
9. What is polymorphism in object-oriented programming?
 - a) Ability to use different types of data in one variable
 - 2) Ability to create several objects of the same class
 - 3) Ability to create a new class based on an existing class
 - 4) The possibility of using the same method by different objects
10. What method is used to output information about a class object?
 - a) repr()
 - 2) str()
 - 3) class()
 - 4) name()

6. LIST OF RECOMMENDED LITERATURE

6.1. Reference citations:

1. Skvortsova T.I. Komp'yuternye kommunikatsii i seti Elektronnyi resurs [Computer communications and networks] / Skvortsova T.I.: uchebno-metodicheskoe posobie. - Moscow: RTU MIREA, 2023. - 223 p., unlimited copies.
2. Berlin A.N. High-speed communication networks: Electronic resource: a textbook. - High-speed communication networks. - Moscow: Internet University of Information Technologies (INTUIT), 2022. - 437 p. - The book is in the basic version of the EBS IPRbooks., copies are unlimited.
3. Proskuryakov A.V. Computer Networks: Fundamentals of Building Computer Networks and Telecommunications: Textbook / A.V. Proskuryakov; Ministry of Science and Higher Education of the Russian Federation; Federal State Autonomous Educational Institution of Higher Education "Southern Federal University"; Engineering and Technology Academy. - Rostov-on-Don|Taganrog: Publishing House of the Southern Federal University, 2020. - 202 p.: ill. - <http://biblioclub.ru/>. - Refs.: p. 195-196. - ISBN 978-5-9275-2792-2, unlimited copies.
4. Galochkin V.A. Circuitry of Analog and Digital Devices Elektronnyi resurs: uchebnoe posobie [Electronic resource: textbook]. - Samara: Volga State University of Telecommunications and Informatics, 2022. - 441 p. - The book is in the basic version of the EBS IPRbooks. - ISBN 978-5-904029-51-7, unlimited copies.
5. Galochkin V.A. Circuitry of Telecommunication Devices. Methodological Developments in Laboratory Work. Part 1. Circuitry of Analog Electronic Devices Electronic resource: Textbook / V. A. Galochkin. - Samara: Volga State University of Telecommunications and Informatics, 2021. - 402 p. - ISBN 2227-8397, unlimited copies.
6. Galochkin V.A. Circuitry of Telecommunication Devices. Part 2. Circuitry of Digital Electronic Devices Electronic resource: Textbook / V. A. Galochkin. - Samara: Volga State University of Telecommunications and Informatics, 2022. - 280 p. - ISBN 2227-8397, unlimited copies.
7. Novikov Y.V. Introduction to Digital Circuitry: A Textbook / Novikov Yu.V. - Moscow, Saratov: Internet University of Information Technologies (INTUIT), IPR Media, 2020. — 392 c. — ISBN 978-5-4497-0314-9. — Text: electronic // Electronic library system IPR BOOKS: [site]. — URL: <http://www.iprbookshop.ru/89431.html>, copies are unlimited.
8. Bastrakova M.I., Pavlov V.V.; Volga State Technological University. - Yoshkar-Ola: PSTU, 2022. - 52 p.: Schemes, ill. - <http://biblioclub.ru/>. - Bibliogr. in the book. - ISBN 978-5-8158-2073-9, unlimited copies.
9. Durkin V.V., Tyrykin S.V., Belorutsky R.Yu.: Textbook. - Novosibirsk: NSTU, 2024. - 88 p. - ISBN 978-5-7782-3937-1, unlimited copies.
10. Sutyagina L. N. Proektirovanie gorodskoy nalozhdennoy multiservisnoy svyazi obshchego usloviya Elektronnyi resurs: uchebno-metodicheskoe posobie. - Samara: Povolzhsky State University of Telecommunications and Informatics, 2016. - 39 p. - The book is in the basic version of EBS IPRbooks., there are unlimited copies.

11. Gvozdeva T.V. Proektirovanie informatsionnykh sistem: tekhnologiya computer-aidnogo proektirovaniya [Design of information systems: technology of computer-aided design]. Laboratory Practicum Elektronnyi resurs / Gvozdeva T. V., Ballod B. A. - 2nd ed., ster. - St. Petersburg: Lan, 2020. - 156 p. - ISBN 978-5-8114-5147-0, unlimited copies.

6.2. Further reading:

1. Efanov V.I. Electric and fiber-optic communication lines: Textbook / Efanov V.I. - Tomsk: Tomsk State University of Control Systems and Radioelectronics, 2012. - 149 p. - The book is in the basic version of the EBS IPRbooks. - ISBN 5-86889-356-5.

2. Fokin V.G. Coherent Optical Networks: A Textbook / Fokin V.G. - Novosibirsk : Siberian State University of Telecommunications and Informatics, 2015. - 371 p. - The book is in the basic version of EBS IPRbooks.

3. Vinokurov V.M. Digital Transmission Systems: A Textbook / Vinokurov V.M. - Tomsk : Tomsk State University of Control Systems and Radioelectronics, 2012. - 160 p. - The book is in the basic version of the EBS IPRbooks.

4. Computing Systems, Networks and Telecommunications: Textbook. Manual for Higher Educational Institutions / N.V. Kandaurov, S.V. Yakovlev, V.P. Yakovlev, V.S. Chekanov. - Moscow: Flint: Nauka, 2011. - 424 p.: ill. - References: p. 416-418. - ISBN 978-5-9765-1109-5.

5. Yengibaryan I.A. Fibro-optic communication lines / I.A. Yengibaryan / V.V. Zuev: textbook Electronic resource: North Caucasian branch of the Moscow Technical University of Communications and Informatics; Rostov-on-Don, 2012. - 152 p. - The book is in the basic version of the EBS IPRbooks.

6. Karlashchuk V.I. Fundamentals of Discrete Message Transmission: Practicum: Textbook. Manual: Direction of Training 210700 - Infocommunication Technologies and Communication Systems. Bachelor, Master / V.I. Karlashchuk, S.V. Yakovlev; Sev.-Kav. Feder. University. - Stavropol: NCFU, 2013. - 309 p. - Vulture: Rek. UMO. - ISBN 978-5-9296-0665-6.

7. Computer Telecommunications. - Tambov: Publishing House of FSBEI HPE "TSTU", 2012. - 224 p.

8. Krukhmalev V.V. Synchronous Telecommunication Systems and Transport Networks: Textbook / Krukhmalev V.V. - Moscow: Educational and Methodological Center for Education on Railway Transport, 2012. - 288 p. - The book is in the basic version of the EBS IPRbooks. - ISBN 978-5-9994-89035-601-7.

9. Krukhmalev V.V. Digital Transmission Systems: Textbook. Manual / V.V. Krukhmalev, V.N. Gordienko, A.D. Mochenov; ed. by A.D. Mochenov. - 2nd ed., revised and supplemented - Moscow: Hot Line - Telecom, 2014. - 372 p.: ill. - Grief: Rek. UMO. - References: p. 371-372. - ISBN 978-5-9912-0226-8.

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7. ORGANIZATION AND CONDUCT OF THE STATE EXAM

The purpose of the state exam is to assess the degree of professional training of a graduate in the use of theoretical knowledge, practical skills and abilities, the level of competence formation to solve professional problems at the level required by the standard.

For the work of the examination commission, the secretary of the State Examination Commission (SEC) submits the following documents: a copy of the order of the rector of NCFU on the admission of students to the SFC, certificates of the implementation of the curriculum for each student admitted to the SFC in accordance with the order on admission, examination sheets on passing the state exam, a form for assessing the level of competence formation by members of the State Examination Commission during the state exam (evaluation sheet).

Before the start of the state examination, the chairman of the state examination commission or, by his order, a member of the state examination commission shall lay out the examination tickets.

When passing the state exam orally, no more than 7 students are allowed to be present in the classroom. Each student independently chooses an examination ticket once by means of arbitrary extraction. The ticket number is recorded by the secretary of the State Examination Commission in the appropriate protocol.

As a rule, the student is given up to 1 hour to prepare for the answer to the examination ticket. When preparing, the student has the right to use the state exam program, as well as reference literature with the permission of the State Examination Commission. Students who use other educational literature, means of communication and computer equipment (except for a calculator) to prepare for the answer are removed from the state exam. In the protocol, after the words "To recognize that the student has passed the state exam with a grade", the entry "unsatisfactory. The student is removed from the state exam for violating the procedure for conducting the state exam". In the exam sheet, the student is also given a grade of "unsatisfactory".

When assessing the student's answer at the state exam, the level of competence formation and other requirements imposed by the fund of assessment tools for the SFC developed by the graduating department are taken into account.

At the end of the student's answer, the chairman and members of the commission can ask additional questions (as a rule, no more than three). The secretary of the commission enters into the minutes of the ticket tasks, additional questions of the commission members, as well as a general description of the student's answer to all questions.

In general, the student's answer to the exam ticket and additional questions takes, as a rule, 30 minutes.

If the student was unable to answer the tasks of the examination ticket for health reasons, the entry "Student could not answer the tasks of the examination ticket for health reasons" is made in the protocol after the words "General characteristics of the answer..." The entry "The student could not answer the tasks of the examination ticket for health reasons" is made in the protocol. The fact of illness must be confirmed by the conclusion of medical workers. The date for retaking the state exam is set in accordance with the procedure established by the Regulations on the Procedure for Conducting State Final Certification for Educational Programs of Higher Education – Bachelor's Programs,

Specialist Programs and Master's Degree Programs at the Federal State Autonomous Educational Institution of Higher Education "North Caucasus Federal University".

At the end of the answers of the students of the academic group, a meeting of the examination commission is announced, which is attended only by members of the commission. At the meeting, the answers of each student to the tasks of the ticket and additional questions are discussed. Based on the results of the discussion, each student is given an appropriate grade in the protocol. The secretary of the State Examination Commission fills out the examination sheet on the results of the state exam. After the meeting of the commission, students of the academic group are invited to the classroom. The Chairman of the State Examination Commission informs students about the results of the state exam.

Based on the results of the state attestation tests, the student has the right to appeal. The student has the right to submit a written appeal to the Appeal Commission about the violation, in his opinion, of the established procedure for conducting the state attestation test and (or) disagreement with the results of the state examination.

The appeal is submitted by the student in person to the Appeal Commission no later than the next working day after the announcement of the results of the state attestation test. The appeal is considered at a meeting of the Appeal Commission no later than 2 working days from the date of its submission, to which the Chairman of the State Examination Commission and the student who filed the appeal are invited. The meeting of the Appeal Commission may be held in the absence of the student who filed the appeal, if he does not appear at the meeting of the Appeal Commission. The deadline for the appeal is set at the time of writing the application by the student and is brought to his attention against signature.

The decision of the appeal commission is documented in the minutes and brought to the attention of the student who filed the appeal within 3 working days from the date of the meeting of the appeal commission. The fact that the student who filed the appeal is familiarized with the decision of the appeal commission is certified by the signature of the student.

When considering an appeal on violation of the procedure for conducting a state attestation test, the Appeal Commission shall make one of the following decisions:

- to reject the appeal, if the information contained in it about violations of the procedure for conducting the state attestation of a student was not confirmed and (or) did not affect the result of the state attestation test;
- to satisfy the appeal, if the information set out in it about the violations of the procedure for conducting the state certification test of the student was confirmed and affected the result of the state certification test.

If the appeal is satisfied, the result of the state final certification is subject to annulment, in connection with which the protocol on the consideration of the appeal is transferred to the state examination commission no later than the next working day for the implementation of the decision of the appeal commission. The student is given the opportunity to pass the state certification test within the time limits established by NCFU.

When considering an appeal on disagreement with the results of the state examination, the Appeal Commission makes one of the following decisions:

- on rejection of the appeal and preservation of the result of the state examination;
- on satisfying the appeal and issuing a different result of the state examination.

The decision of the Appeal Commission is final and not subject to revision.

The repeated state certification test of a student who has filed an appeal is carried out in the presence of the chairman or one of the members of the appeal commission no later than the date of completion of training at NCFU in accordance with the standard. An appeal for a second state certification test is not accepted.

8. DESCRIPTION OF INDICATORS AND CRITERIA FOR ASSESSING COMPETENCIES, AS WELL AS ASSESSMENT SCALES

8.1 Description of indicators

competence, indicator	Levels of competence and indicators			
	The minimum level has not been reached (unsatisfactory) 2 points	Minimum level (satisfactory) 3 points	Intermediate level (good) 4 points	High level (excellent) 5 points
<i>Competency: UK-1</i>				
Learning outcomes: <i>Indicator:</i> ID-1 UK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the process of identifying a problem situation, its multivariate analysis and diagnostics based on a systematic approach.	Quite confidently identifies a problem situation, carries out its multifactorial analysis and diagnostics based on a systematic approach. Makes minor mistakes.	Accurately and reasonably identifies a problem situation, carries out its multifactorial analysis and diagnosis based on a systematic approach.
Learning outcomes: <i>Indicator:</i> ID-2 UK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the process of searching, selecting and systematizing information to determine alternative options for strategic solutions in a problem situation.	Basically, correctly conducts the search, selection and systematization of information to determine alternative options for strategic solutions in a problem situation. Makes minor mistakes.	Competently searches, selects and systematizes information to determine alternative options for strategic solutions in a problem situation.
Learning outcomes: <i>Indicator:</i> ID-3 UK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the process of identifying and assessing the risks of possible solutions to a problem situation, choosing the best option for its solution.	In general, correctly identifies and assesses the risks of possible solutions to a problem situation, chooses the best option for its solution. Makes minor mistakes.	Competently identifies and assesses the risks of possible solutions to a problem situation, chooses the best option for its solution.
<i>Competency: UK-2</i>				

Learning outcomes: <i>Indicator:</i> ID-1 UK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the process of formulating the goal of the project, determining a set of interrelated tasks that ensure its achievement and determining the expected results of solving problems.	In general , correctly formulates the goal of the project, determines a set of interrelated tasks that ensure its achievement and determines the expected results of solving problems. Makes minor mistakes.	Correctly formulates the goal of the project, determines a set of interrelated tasks that ensure its achievement and determines the expected results of solving problems.
Learning outcomes: <i>Indicator:</i> ID-2 UK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the process of developing an action plan to solve the tasks of the project, choosing a way to solve them, based on the current legal norms and available resources and restrictions.	In general , he correctly develops an action plan to solve the problems of the project, choosing the best way to solve them, based on the current legal norms and available resources and restrictions. Makes minor mistakes.	Accurately and reasonably develops an action plan to solve the tasks of the project, choosing the best way to solve them, based on the current legal norms and available resources and constraints.
Learning outcomes: <i>Indicator:</i> ID-3 UK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the process of ensuring the implementation of the project in accordance with the established goals, deadlines and costs, based on current legal regulations, available resources and constraints, including the use of digital tools.	Generally ensures that the project is carried out correctly in accordance with the set goals, deadlines and costs, based on current legal regulations, available resources and constraints, including the use of digital tools. Makes minor mistakes.	Competently ensures the implementation of the project in accordance with the established goals, deadlines and costs, based on current legal regulations, available resources and restrictions, including the use of digital tools.
Competence: UK-3				
Learning outcomes: <i>Indicator:</i> ID-1 UK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when participating in interpersonal and group interactions, partly using an inclusive approach, effective communication, team-building and teamwork methods when working together within the framework of the task.	Quite confidently participates in interpersonal and group interaction, using an inclusive approach, effective communication, methods of team building and team interaction when working together within the framework of the task. Makes minor mistakes.	Fully participates in interpersonal and group interactions, effectively using an inclusive approach, effective communication, team-building and teamwork methods when working together within the framework of the task.
Learning outcomes: <i>Indicator:</i> ID-2 UK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when ensuring the work of the team in order to obtain optimal results of joint work, taking	In general , he correctly ensures the work of the team in order to obtain optimal results of joint work, taking	Ensures the work of the team with great efficiency in order to obtain optimal results of joint

		into account the individual capabilities of its members, the use of methodology for achieving success, methods, information technologies and foresight technologies.	into account the individual capabilities of its members, the use of methodology for achieving success, methods, information technologies and foresight technologies. Makes minor mistakes.	work, taking into account the individual capabilities of its members, the use of methodology for achieving success, methods, information technologies and foresight technologies.
Learning outcomes: <i>Indicator:</i> ID-3 UK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in ensuring that tasks are completed based on monitoring teamwork and responding to significant deviations.	Generally correctly ensures the implementation of assigned tasks based on monitoring teamwork and responding to significant deviations. Makes minor mistakes.	With great efficiency, it ensures the fulfillment of tasks based on the monitoring of teamwork and timely response to significant deviations.
Competency: UK-4				
Learning outcomes: <i>Indicator:</i> ID-1 UK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when choosing the style of business communication in the state and foreign languages, verbal and non-verbal means of interaction with partners in oral and written forms.	In general , he correctly chooses an acceptable style of business communication in the state and foreign languages, verbal and non-verbal means of interaction with partners in oral and written forms. Makes minor mistakes.	Independently and competently chooses an acceptable style of business communication in the state and foreign languages, verbal and non-verbal means of interaction with partners in oral and written forms.
Learning outcomes: <i>Indicator:</i> ID-2 UK-4	Unable to complete tasks related to this competency achievement indicator.	Insufficiently applies in practice communication technologies, methods and methods of business communication for academic and professional interaction.	Quite confidently uses information and communication technologies to increase the efficiency of professional interaction, search for the necessary information in the process of solving standard communicative tasks in the state and foreign languages. Makes minor mistakes.	He fully uses information and communication technologies to increase the efficiency of professional interaction, high-quality search for the necessary information in the process of solving standard communicative tasks in the state and foreign languages.
Learning outcomes: <i>Indicator:</i> ID-3 UK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when assessing the effectiveness of the communication technologies used in professional interaction in the state and foreign languages, as well as when choosing the optimal ones.	Quite confidently evaluates the effectiveness of the applied communicative technologies in professional interaction in the state and	Competently evaluates the effectiveness of the applied communication technologies in professional interaction in the state and foreign languages, independently

			foreign languages, basically correctly chooses the optimal ones. Makes minor mistakes.	makes a choice of the optimal ones.
Competency: UK-5				
Learning outcomes: <i>Indicator:</i> ID-1 UK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when identifying, comparing and analyzing information about the cultural characteristics and traditions of various social groups, to choose a strategy for interacting with their carriers.	Quite confidently identifies, compares and analyzes information about the cultural characteristics and traditions of various social groups, to choose a strategy for interaction with their carriers. Makes minor mistakes.	Independently and competently identifies, compares and analyzes information about the cultural characteristics and traditions of various social groups, in order to choose the optimal strategy for interaction with their carriers.
Learning outcomes: <i>Indicator:</i> ID-2 UK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when demonstrating respect for the historical heritage and socio-cultural traditions of various social groups, based on knowledge of the stages of historical development of Russia (including the main events, main historical figures) in the context of world history and a number of cultural traditions of the world (depending on the environment and the tasks of education), including some world religions, philosophical and ethical teachings.	In general, he demonstrates a respectful attitude to the historical heritage and socio-cultural traditions of various social groups, based on knowledge of individual stages of the historical development of Russia (including the main events, the main historical figures) in the context of world history and a number of cultural traditions of the world (depending on the environment and the tasks of education), including some world religions, philosophical and ethical teachings. Makes minor mistakes.	Fully and independently demonstrates respect for the historical heritage and socio-cultural traditions of various social groups, based on knowledge of the stages of historical development of Russia (including the main events, the main historical figures) in the context of world history and a number of cultural traditions of the world (depending on the environment and the tasks of education), including various world religions, philosophical and ethical teachings.
Learning outcomes: <i>Indicator:</i> ID-3 UK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when choosing ways of constructive interaction with people, taking into account their socio-cultural characteristics in order to successfully perform professional tasks and strengthen social integration.	Quite confidently chooses ways of constructive interaction with people, taking into account their socio-cultural characteristics, in order to successfully perform professional tasks and strengthen social integration. Makes minor mistakes.	Independently and responsibly chooses ways of constructive interaction with people, taking into account their socio-cultural characteristics, in order to successfully perform professional tasks and strengthen social integration.

Learning outcomes: <i>Indicator:</i> ID-4 UK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the analysis of various socio-cultural trends, facts and phenomena on the basis of a holistic view of the foundations of the universe and the prospects for its development, insufficiently understands the relationship between the diversity of worldviews and the course of development of history, science, man's ideas about nature, society, cognition and himself.	Quite confidently analyzes various socio-cultural trends, facts and phenomena on the basis of a holistic view of the foundations of the universe and the prospects for its development, in general understands the relationship between the diversity of worldviews and the course of development of history, science, human ideas about nature, society, cognition and himself. Makes minor mistakes.	Fully analyzes various socio-cultural trends, facts and phenomena on the basis of a holistic view of the foundations of the universe and the prospects for its development, independently understands the relationship between the diversity of worldviews and the course of development of history, science, human ideas about nature, society, cognition and himself.
Competency: UK-6				
Learning outcomes: <i>Indicator:</i> ID-1 UK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in determining personal and professional goals in accordance with the level of his resources and priorities of actions, for successful development in the chosen field of professional activity.	Quite confidently sets personal and professional goals in accordance with the level of his resources and priorities of actions, for successful development in the chosen field of professional activity. Makes minor mistakes.	Independently and competently sets personal and professional goals in accordance with the level of his resources and priorities of actions, for successful development in the chosen field of professional activity.
Learning outcomes: <i>Indicator:</i> ID-2 UK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the implementation and adjustment of the strategy of personal and professional development, taking into account the conditions, means, personal capabilities, stages of career growth, the time perspective of the development of activities and the requirements of the labor market.	In general, correctly implements and adjusts the strategy of personal and professional development, taking into account the conditions, means, personal capabilities, stages of career growth, time perspective for the development of activities and the requirements of the labor market. Makes minor mistakes.	Independently, fully implements and adjusts the strategy of personal and professional development, taking into account the conditions, means, personal capabilities, stages of career growth, time perspective for the development of activities and the requirements of the labor market.
Learning outcomes: <i>Indicator:</i> ID-3 UK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the course of critical assessment of the effectiveness of the use of time and other resources in solving tasks in the chosen field of professional activity.	Basically, he critically evaluates the effectiveness of the use of time and other resources in solving tasks in the chosen field of professional activity. Makes minor mistakes.	Fully critically assesses the effectiveness of the use of time and other resources in solving tasks in the chosen field of professional activity.

<i>Competency: UK-7</i>				
Learning outcomes: <i>Indicator:</i> ID-1 UK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the use of health-saving technologies to ensure full-fledged social and professional activities, taking into account the physiological characteristics of the body and living conditions.	He mainly uses health-saving technologies to ensure full-fledged social and professional activities, taking into account the physiological characteristics of the body and living conditions. Makes minor mistakes.	Fully uses health-saving technologies to ensure full-fledged social and professional activities, taking into account the physiological characteristics of the body and living conditions.
Learning outcomes: <i>Indicator:</i> ID-2 UK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in planning his work and free time for the optimal combination of physical and mental load and ensuring efficiency in professional activities.	Sufficiently plans his working and free time for the optimal combination of physical and mental load and ensuring efficiency in professional activities. Makes minor mistakes.	Fully plans his working and free time for the optimal combination of physical and mental load and ensuring efficiency in professional activities.
Learning outcomes: <i>Indicator:</i> ID-3 UK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in maintaining the proper level of physical fitness to ensure full-fledged social and professional activities and in observing the norms of a healthy lifestyle.	Sufficiently maintains the proper level of physical fitness to ensure full social and professional activities and observes the norms of a healthy lifestyle. Makes minor mistakes.	Fully maintains the proper level of physical fitness to ensure full-fledged social and professional activities and observes the norms of a healthy lifestyle.
<i>Competence: UK-8</i>				
Learning outcomes: <i>Indicator:</i> ID-1 UK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in ensuring security and sustainable development in various spheres of life; as well as in classifying military emergencies, based on knowledge of the principles and methods of organizing the protection of the population from dangers arising in peacetime and during military operations.	Basically, correctly ensures safety and sustainable development in various spheres of life; classifies military emergencies based on knowledge of the principles and methods of organizing the protection of the population from dangers arising in peacetime and during military operations. Makes minor mistakes.	Competently ensures safety and sustainable development in various spheres of life; classifies military emergencies based on knowledge of the principles and methods of organizing the protection of the population from dangers arising in peacetime and during hostilities.

Learning outcomes: <i>Indicator:</i> ID-2 UK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when assessing the probability of potential danger in everyday life and professional activities and taking measures to prevent it.	In general, correctly assesses the probability of potential danger in everyday life and professional activities and takes measures to prevent it. Makes minor mistakes.	Fully assesses the probability of potential danger in everyday life and professional activities and takes effective measures to prevent it.
Learning outcomes: <i>Indicator:</i> ID-3 UK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the application of basic methods of protection in the threat and occurrence of emergencies and military conflicts in everyday life and professional activities.	In general, correctly applies the basic methods of protection in the threat and occurrence of emergencies and military conflicts in everyday life and professional activities. Makes minor mistakes.	With great efficiency, he applies the basic methods of protection in the threat and occurrence of emergencies and military conflicts in everyday life and professional activities.
Competency: UK-9				
Learning outcomes: <i>Indicator:</i> ID-1 UK-9	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the basic principles of the functioning of the economy and economic development, the goals and forms of state participation in the economy.	In general, he correctly understands the basic principles of the functioning of the economy and economic development, the goals and forms of state participation in the economy. Makes minor mistakes.	Fully understands the basic principles of the functioning of the economy and economic development, the goals and forms of state participation in the economy.
Learning outcomes: <i>Indicator:</i> ID-2 UK-9	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the course of applying personal economic and financial planning methods to achieve current and long-term financial goals.	In general, correctly applies the methods of personal economic and financial planning to achieve current and long-term financial goals. Makes minor mistakes.	Competently applies the methods of personal economic and financial planning to achieve current and long-term financial goals.
Learning outcomes: <i>Indicator:</i> ID-3 UK-9	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when using financial instruments to manage personal finances, as well as when controlling their own economic and financial risks.	Basically, he correctly uses financial instruments to manage personal finances, controls his own economic and financial risks. Makes minor mistakes.	Competently and independently uses financial instruments to manage personal finances, controls his own economic and financial risks.
Competence: UK-10				

Learning outcomes: <i>Indicator:</i> ID-1 UK-10	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the current legal norms that ensure the fight against corruption in various areas of life, in the ways of preventing corruption and forming an intolerant attitude towards it.	He is sufficiently familiar with the current legal norms that ensure the fight against corruption in various areas of life, with ways to prevent corruption and form an intolerant attitude towards it.	He is fully familiar with the current legal norms that ensure the fight against corruption in various areas of life, with ways to prevent corruption and form an intolerant attitude towards it.
Learning outcomes: <i>Indicator:</i> ID-2 UK-10	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the prevention of corruption risks in professional activities; in the exclusion of interference in his/her professional activities in cases of inducement to corruption offenses.	Sufficiently prevents corruption risks in professional activities; excludes interference in their professional activities in cases of inducement to corruption offenses.	Fully prevents corruption risks in professional activities; excludes interference in his/her professional activities in cases of inducement to corruption offenses.
Learning outcomes: <i>Indicator:</i> ID-3 UK-10	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in interaction in society based on intolerance of corruption.	It almost unmistakably interacts in society on the basis of an intolerant attitude to corruption.	He fully interacts in society on the basis of an intolerant attitude to corruption.
Competency: OPK-1				
Learning outcomes: <i>Indicator:</i> ID-1 OPK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the fundamental laws of nature and the basic physical mathematical laws and methods of accumulating, transmitting and processing information.	Generally correctly understands the fundamental laws of nature and the basic physical mathematical laws and methods of accumulating, transmitting and processing information. Makes minor mistakes.	Fully understands the fundamental laws of nature and the basic physical mathematical laws and methods of accumulating, transmitting and processing information.
Learning outcomes: <i>Indicator:</i> ID-2 OPK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the course of applying physical laws and mathematical methods to solve problems of a theoretical and applied nature.	Basically, correctly applies physical laws and mathematical methods to solve problems of a theoretical and applied nature. Makes minor mistakes.	Competently applies physical laws and mathematical methods to solve problems of a theoretical and applied nature.
Learning outcomes: <i>Indicator:</i> ID-3 OPK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the course of using knowledge of physics and mathematics in solving practical problems.	Basically, correctly uses knowledge of physics and mathematics when solving practical problems. Makes minor mistakes.	Uses knowledge of physics and mathematics with great efficiency in solving practical problems.
Competency: OPK-2				

Learning outcomes: <i>Indicator:</i> ID-1 OPK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the search and critical analysis of information necessary to solve the problem.	In general, correctly finds and critically analyzes the information necessary to solve the problem. Makes minor mistakes.	Competently finds and critically analyzes the information necessary to solve the problem.
Learning outcomes: <i>Indicator:</i> ID-2 OPK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the course of developing a solution to a specific problem, choosing the best option, assessing its advantages and disadvantages.	Basically, he correctly develops a solution to a specific problem, choosing the best option, evaluating its advantages and disadvantages. Makes minor mistakes.	Independently and competently develops a solution to a specific problem, choosing the best option, evaluating its advantages and disadvantages.
Learning outcomes: <i>Indicator:</i> ID-3 OPK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the basic methods and means of conducting experimental research, as well as standardization and certification systems.	In general, he correctly understands the main methods and means of conducting experimental research, standardization and certification systems. Makes minor mistakes.	Fully understands the basic methods and means of conducting experimental research, standardization and certification systems.
Learning outcomes: <i>Indicator:</i> ID-4 OPK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the course of choosing methods and means of measurement and conducting experimental research.	In general, he correctly chooses methods and means of measurement and conducts experimental research. He makes minor mistakes.	Competently and independently chooses methods and means of measurement and effectively conducts experimental research.
Learning outcomes: <i>Indicator:</i> ID-5 OPK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the application of methods for processing and presenting the data obtained, as well as assessing the error of measurement results.	Quite confidently knows the methods of processing and presenting the data obtained and assessing the error of measurement results. Makes minor mistakes.	He is fully proficient in the methods of processing and presenting the data obtained and assessing the error of measurement results.
Competency: OPK-3				
Learning outcomes: <i>Indicator:</i> ID-1 OPK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the basic patterns of information transmission in information and communication systems, the main types of signals used in telecommunication systems, the features of the transmission of various signals through channels and paths of telecommunication systems.	In general, correctly understands the basic patterns of information transmission in information and communication systems, the main types of signals used in telecommunication systems, the features of the transmission of various signals	Fully understands the basic patterns of information transmission in infocommunication systems, the main types of signals used in telecommunication systems, the features of the transmission of various signals through channels and paths of telecommunication systems.

			through channels and paths of telecommunication systems. Makes minor mistakes.	
Learning outcomes: <i>Indicator:</i> ID-2 OPK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the principles, basic algorithms and devices of digital signal processing; the principles of building telecommunication systems of various types and methods of information distribution in communication networks.	In general, he correctly understands the principles, basic algorithms and devices of digital signal processing; the principles of building telecommunication systems of various types and methods of information distribution in communication networks. Makes minor mistakes.	Fully understands the principles, basic algorithms and devices of digital signal processing; the principles of building telecommunication systems of various types and methods of information distribution in communication networks.
Learning outcomes: <i>Indicator:</i> ID-3 OPK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when solving data processing problems using computer technology.	Basically, correctly solves data processing problems using computer technology. Makes minor mistakes.	Competently and independently solves the problems of data processing with the help of computer technology.
Learning outcomes: <i>Indicator:</i> ID-4 OPK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the development of probabilistic models for specific processes, carrying out the necessary calculations within the framework of the constructed model.	Basically, correctly builds probabilistic models for specific processes, conducts the necessary calculations within the framework of the built model. Makes minor mistakes.	Independently builds probabilistic models for specific processes, competently conducts the necessary calculations within the framework of the built model.
Learning outcomes: <i>Indicator:</i> ID-5 OPK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when using information security methods.	He mainly knows the methods and skills of ensuring information security. Makes minor mistakes.	He is fluent in the methods and skills of ensuring information security.
Competency: OPK-4				
Learning outcomes: <i>Indicator:</i> ID-1 OPK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when using information and communication technologies when searching for the necessary information.	Basically, correctly uses information and communication technologies when searching for the necessary information. Makes minor mistakes.	Makes full use of information and communication technologies when searching for the necessary information.

Learning outcomes: <i>Indicator:</i> ID-2 OPK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when designing a solution to a specific project problem, choosing the best way to solve it, based on current legal norms and available resources and restrictions.	In general, correctly designs the solution to a specific project problem, choosing the best way to solve it, based on the current legal norms and available resources and restrictions. Makes minor mistakes.	Competently and independently designs a solution to a specific project task, choosing the best way to solve it, based on current legal norms and available resources and restrictions.
Learning outcomes: <i>Indicator:</i> ID-3 OPK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding modern interactive software systems and basic methods of processing experimental data, including the use of standard software, general-purpose and special-purpose software packages.	In general, the child correctly understands modern interactive software systems and the basic methods of processing experimental data, including the use of standard software, general-purpose and special-purpose software packages. Makes minor mistakes.	Fully understands modern interactive software systems and basic methods of processing experimental data, including the use of standard software, general and special-purpose software packages.
Learning outcomes: <i>Indicator:</i> ID-4 OPK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the use of the capabilities of computer technology and software to solve problems of control and algorithmization of information processing processes.	Basically, correctly uses the capabilities of computer technology and software to solve problems of control and algorithmization of information processing processes. Makes minor mistakes.	With great efficiency, it uses the capabilities of computer technology and software to solve problems of control and algorithmization of information processing processes.
Learning outcomes: <i>Indicator:</i> ID-5 OPK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when using methods of computer modeling of physical processes in the transmission of information, as well as the use of engineering and computer graphics techniques.	He is quite confident in the methods of computer modeling of physical processes in the transmission of information, engineering and computer graphics techniques. He makes minor mistakes.	He is fully proficient in the methods of computer modeling of physical processes in the transmission of information, engineering and computer graphics techniques.
Competence: OPK-5				
Learning outcomes: <i>Indicator:</i> ID-1 OPK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when choosing programming languages and languages for working with databases, environments for the development of information systems and technologies, based on the existing tasks.	Quite confidently chooses programming languages and languages for working with databases, environments for the development of information systems and technologies,	Competently chooses programming languages and languages for working with databases, environments for the development of information systems and technologies, based on existing tasks.

			based on the existing tasks. Makes minor mistakes.	
Learning outcomes: <i>Indicator:</i> ID-2 OPK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when reading the codes of software products written in mastered programming languages, and making the required changes.	Reads the codes of software products written in mastered programming languages quite confidently and makes the necessary changes. Makes minor mistakes.	Competently and independently reads the codes of software products written in mastered programming languages, and makes the required changes.
Learning outcomes: <i>Indicator:</i> ID-3 OPK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the development of original algorithms and computer programs suitable for practical application.	Quite confidently develops original algorithms and computer programs suitable for practical use. Makes minor mistakes.	With great efficiency, it develops original algorithms and computer programs suitable for practical application.
Competency: PK-1				
Learning outcomes: <i>Indicator:</i> ID-1 PK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding and orientation in the principles of construction and operation of communication networks, including their constituent subsystems, and signaling protocols, standards for the quality of data, voice and video transmission used in communication networks, in the legislation of the Russian Federation in the field of communications.	In general, he correctly understands and orients himself in the principles of construction and operation of communication networks, including their constituent subsystems, and signaling protocols, standards for the quality of data, voice and video transmission used in communication networks, in the legislation of the Russian Federation in the field of communications. Makes minor mistakes.	Fully understands and is guided by the principles of construction and operation of communication networks, including their constituent subsystems, and signaling protocols, standards for the quality of data, voice and video transmission used in communication networks, in the legislation of the Russian Federation in the field of communications.
Learning outcomes: <i>Indicator:</i> ID-2 PK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the analysis of statistical parameters of traffic, the development of decisions on the operational reconfiguration of the network, changing the parameters of the switching subsystem, network platforms, the use of equipment of new technologies; as well	In general, it correctly analyzes the statistical parameters of traffic, develops solutions for the prompt reconfiguration of the network, changing the parameters of the switching subsystem, network platforms, for the use of equipment for new technologies; changing and adjusting the parameters of the	Competently analyzes the statistical parameters of traffic, develops solutions for the prompt reconfiguration of the network, changing the parameters of the switching subsystem, network platforms, for the use of new technology equipment; changing and adjusting the parameters of

		as changing and adjusting the parameters of the switching subsystem, transport networks and data transmission networks, on the organization of new and expansion of existing communication directions.	switching subsystem, transport networks and data transmission networks, for organizing new and expanding existing communication directions. Makes minor mistakes.	the switching subsystem, transport networks and data transmission networks, for organizing new and expanding existing communication directions.
Learning outcomes: <i>Indicator:</i> ID-3 PK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the analysis of statistics of the main performance indicators of radio systems and data transmission systems, the development of measures to maintain them at the required level, and the calculation of the capacity of telecommunication networks.	Basically, correctly analyzes the statistics of the main indicators of the efficiency of radio systems and data transmission systems, develops measures to maintain them at the required level, and calculates the bandwidth of telecommunications networks. Makes minor mistakes.	Independently analyzes the statistics of the main performance indicators of radio systems and data transmission systems, develops measures to maintain them at the required level, and calculates the capacity of telecommunications networks.
Learning outcomes: <i>Indicator:</i> ID-4 PK-1	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the development of communication schemes and integration of new network elements, the construction and expansion of the switching subsystem and network platforms; the performance of work on switching equipment, the deployment of service platform equipment, the equipment of new technologies on the network, the implementation of plans to expand the existing equipment of network platforms and new technologies.	Quite confidently develops schemes for the organization of communication and integration of new network elements, builds and expands the switching subsystem and network platforms; performs work on switching equipment, deploys equipment of service platforms, equipment of new technologies on the network, fulfills plans for the expansion of existing equipment of network platforms and new technologies. Makes minor mistakes.	With great efficiency, develops schemes for the organization of communication and integration of new network elements, builds and expands the switching subsystem and network platforms; performs work on switching equipment, deploys equipment for service platforms, equipment for new technologies on the network, fulfills plans for the expansion of existing equipment of network platforms and new technologies.
Competency: PK-2				
Learning outcomes: <i>Indicator:</i> ID-1 PK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the basics of electrical engineering, network technologies, principles of operation, indicators of the use and functioning of telecommunication	In general, he correctly understands the basics of electrical engineering, network technologies, principles of operation, indicators of the use and functioning of telecommunication	Fully understands the basics of electrical engineering, network technologies, principles of operation, indicators of the use and functioning of telecommunication

		equipment, the requirements of technical regulations, international and national standards and other regulatory documents in the field of assessing the quality indicators of the operation of information and communication equipment.	equipment, the requirements of technical regulations, international and national standards and other regulatory documents in the field of assessing the quality indicators of information and communication equipment. Makes minor mistakes.	equipment, the requirements of technical regulations, international and national standards and other regulatory documents in the field of assessing the quality indicators of information and communication equipment.
Learning outcomes: <i>Indicator:</i> ID-2 PK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in compliance with the requirements of programs and methods for conducting experimental tests of communication facilities and systems (information and communication equipment).	Quite confidently complies with the requirements of programs and methods for conducting experimental tests of objects and communication systems (information and communication equipment). Makes minor mistakes.	Fully complies with the requirements of programs and methods for conducting experimental tests of communication facilities and systems (information and communication equipment).
Learning outcomes: <i>Indicator:</i> ID-3 PK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when working with software used in the processing of information of information and communication systems and their components, technical means of data collection and processing, with various information systems and databases.	In general, it correctly works with software used in the processing of information from infocommunication systems and their components, technical means of data collection and processing, with various information systems and databases. Makes minor mistakes.	Competently and independently works with software used in the processing of information from infocommunication systems and their components, technical means of data collection and processing, with various information systems and databases.
Learning outcomes: <i>Indicator:</i> ID-4 PK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when monitoring the quality indicators of information and communication equipment in accordance with their standard indicators.	In general, correctly controls the quality indicators of the information and communication equipment in accordance with their regulatory indicators. Makes minor mistakes.	Effectively controls the quality indicators of the operation of information and communication equipment in accordance with their regulatory indicators.
Learning outcomes: <i>Indicator:</i> ID-5 PK-2	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when conducting experimental studies on existing programs and methods of testing objects and communication systems (information and communication	In general, he correctly conducts experimental research on the existing programs and methods of testing objects and communication systems (information and communication equipment) in order to assess	Competently and independently conducts experimental research on existing programs and methods of testing objects and communication systems (information and communication equipment)

		equipment) in order to assess their quality performance.	their quality performance. Makes minor mistakes.	in order to assess their quality performance.
Competency: PK-3				
Learning outcomes: <i>Indicator:</i> ID-1 PK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the understanding of regulatory, regulatory, technical, organizational and methodological documents governing the design preparation, implementation and operation of communication systems (telecommunication systems), the construction of facilities and communication lines.	In general, he correctly understands the regulatory, normative, technical, organizational and methodological documents governing the design preparation, implementation and operation of communication systems (telecommunication systems), the construction of facilities and communication lines. Makes minor mistakes.	Fully understands the regulatory, regulatory, technical, organizational and methodological documents governing the design preparation, implementation and operation of communication systems (telecommunication systems), the construction of facilities and communication lines.
Learning outcomes: <i>Indicator:</i> ID-2 PK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the application of technologies used on the transport network, with modern requirements for performance, availability, security, scalability, integration of technologies, manageability of communication systems (telecommunications); principles of planning the capacity of radio access networks.	Basically, correctly operates the technologies used on the transport network, modern requirements for performance, availability, security, scalability, technology integration, manageability of communication systems (telecommunications); principles of planning the capacity of radio access networks. Makes minor mistakes.	Perfectly operates with the technologies used in the transport network, modern requirements for performance, availability, security, scalability, technology integration, manageability of communication systems (telecommunications); principles of planning the capacity of radio access networks.
Learning outcomes: <i>Indicator:</i> ID-3 PK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when calculating the parameters and characteristics of the network and infocommunication tools, analyzing their quality indicators based on statistics and radio measurements, using specialized design software.	Basically, correctly calculates the parameters and characteristics of the network and infocommunication tools, analyzes their qualitative indicators based on statistics and radio measurements, uses specialized design software. Makes minor mistakes.	Competently and independently calculates the parameters and characteristics of the network and infocommunication tools, analyzes their qualitative indicators based on statistics and radio measurements, uses specialized design software.

Learning outcomes: <i>Indicator:</i> ID-4 PK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when identifying and analyzing the advantages and disadvantages of design solutions, assessing the risks associated with the implementation of the project.	Quite confidently identifies and analyzes the advantages and disadvantages of design solutions, assesses the risks associated with the implementation of the project. Makes minor mistakes.	Competently and independently identifies and analyzes the advantages and disadvantages of design solutions, assesses the risks associated with the implementation of the project.
Learning outcomes: <i>Indicator:</i> ID-5 PK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when collecting initial data for the design of the network and infocommunication tools, determining the optimal configuration and topology of the transport network; developing technical solutions for the implementation of the communication system (telecommunication system) and its components.	Quite confidently collects initial data for the design of the network and infocommunication facilities, determining the optimal configuration and topology of the transport network; develops technical solutions for the implementation of the communication system (telecommunication system) and its components. Makes minor mistakes.	Independently collects initial data for the design of the network and infocommunication tools, determines the optimal configuration and topology of the transport network; competently develops technical solutions for the implementation of the communication system (telecommunication system) and its components.
Learning outcomes: <i>Indicator:</i> ID-6 PK-3	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the development of circuit design solutions for the components of radio electronic facilities, the selection of the element base for the development of circuit solutions, the conduct of automated modeling and experimental work to check the technical characteristics of the modernized radio electronic facilities	Quite confidently carries out the development of circuit design solutions for the components of radio-electronic facilities, the selection of the element base for the development of circuit solutions, conducts automated modeling and experimental work to check the technical characteristics of the modernized radio-electronic facilities. Makes minor mistakes.	Fully carries out the development of circuit design solutions for the components of radio electronic facilities, the selection of the element base for the development of circuit solutions, conducts automated modeling and experimental work to check the technical characteristics of the modernized radio electronic facilities.
<i>Competency: PK-4</i>				

Learning outcomes: <i>Indicator:</i> ID-1 PK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in compliance with the principles of the system approach in the design of communication systems (telecommunications), infocommunication facilities and their components, requirements for the development of technical documentation.	In general, correctly observes the principles of the system approach in the design of communication systems (telecommunications), infocommunication facilities and their components, the requirements for the development of technical documentation. Makes minor mistakes.	Fully complies with the principles of the system approach in the design of communication systems (telecommunications), infocommunication facilities and their components, the requirements for the development of technical documentation.
Learning outcomes: <i>Indicator:</i> ID-2 PK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding and orientation in the principles of construction and operation of infocommunication tools and their components, modern technical solutions for the implementation of communication systems (telecommunication systems) and its components, the software used.	In general, he correctly understands and navigates the principles of construction and operation of infocommunication tools and their components, modern technical solutions for the implementation of communication systems (telecommunication systems) and its components, the software used. Makes minor mistakes.	Fully understands and is guided by the principles of construction and operation of infocommunication tools and their components, modern technical solutions for the implementation of communication systems (telecommunication systems) and its components, and the software used.
Learning outcomes: <i>Indicator:</i> ID-3 PK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the development of project documentation in accordance with standards and technical regulations; development and presentation of presentation materials on the project.	Quite confidently develops project documentation in accordance with standards and technical regulations; develops and presents presentation materials for the project. Makes minor mistakes.	Competently and independently develops project documentation in accordance with standards and technical regulations; develops and submits presentation materials for the project.
Learning outcomes: <i>Indicator:</i> ID-4 PK-4	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the course of developing technical solutions when creating a communication system (telecommunication system) and its components; preparing a communication organization scheme, equipment placement plan, passage scheme and other necessary documents.	Basically, correctly develops technical solutions for the creation of a communication system (telecommunication system) and its components; prepares a communication organization scheme, equipment placement plan, passage scheme and other necessary documents; estimates of costs for the creation	Accurately and reasonably develops technical solutions for the creation of a communication system (telecommunication system) and its components; preparation of a communication organization scheme, equipment placement plan, passage scheme and other necessary documents; estimation

		ments; estimating the costs of creating (modernizing) a communication system (telecommunication system).	(modernization) of a communication system (telecommunication system). Makes minor mistakes.	of costs for the creation (modernization) of a communication system (telecommunication system).
Competency: PK-5				
Learning outcomes: <i>Indicator:</i> ID-1 PK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when understanding the current industry standards that determine the requirements for the parameters of equipment, channels and paths; methods for checking the technical condition of equipment, paths and transmission channels.	In general, he correctly understands the current industry standards that determine the requirements for the parameters of the operation of equipment, channels and paths; methods for checking the technical condition of equipment, paths and transmission channels. Makes minor mistakes.	Perfectly understands the current industry standards that determine the requirements for the parameters of the operation of equipment, channels and paths; methods for checking the technical condition of equipment, paths and transmission channels.
Learning outcomes: <i>Indicator:</i> ID-2 PK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in compliance with the technologies for setting up, adjusting and testing communication (telecommunications) equipment, operating rules and methods of using measuring and testing equipment.	In general, correctly observes the technologies for setting up, adjusting and testing communication equipment (telecommunications), operating rules and methods of using measuring and testing equipment. Makes minor mistakes.	Accurately and reasonably observes the technologies for setting up, adjusting and testing communication (telecommunications) equipment, operating rules and methods of using measuring and testing equipment.
Learning outcomes: <i>Indicator:</i> ID-3 PK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when making adjustments, adjustments and tests of communication equipment (telecommunications) using technical and technological documentation; maintaining technical and technological documentation in accordance with the established forms; checking the quality of equipment and communication facilities.	Confidently performs settings, adjustments and tests of communication equipment (telecommunications) using technical and technological documentation; maintains technical and technological documentation in accordance with the established forms; checks the quality of equipment and communication facilities. Makes minor mistakes.	Competently and independently performs settings, adjustments and tests of communication equipment (telecommunications) using technical and technological documentation; maintains technical and technological documentation in accordance with the established forms; checks the quality of equipment and communication facilities.

Learning outcomes: <i>Indicator:</i> ID-4 PK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes during the incoming inspection of equipment, preparation of testing equipment, measuring equipment, devices; testing equipment and working out the operating modes of the equipment.	Basically, correctly conducts incoming inspection of equipment, preparation of testing equipment, measuring equipment, devices; testing of equipment and development of equipment operating modes. Makes minor mistakes.	Perfectly conducts incoming inspection of equipment, preparation of test equipment, measuring equipment, devices; testing of equipment and development of equipment operating modes.
Learning outcomes: <i>Indicator:</i> ID-5 PK-5	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the selection and use of appropriate test and measuring equipment, the use of equipment software when setting it up.	Quite confidently selects and uses the appropriate test and measuring equipment, uses the equipment software when setting it up. Makes minor mistakes.	Independently and competently selects and uses the appropriate test and measuring equipment, uses the equipment software when setting it up.
Competency: PK-6				
Learning outcomes: <i>Indicator:</i> ID-1 PK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the architecture and general principles of functioning, hardware, software and software and hardware of the administered network, the procedure for configuring network elements of the information and communication system.	In general, he correctly understands the architecture and general principles of the functioning of hardware, software and software and hardware of the administered network, the procedure for configuring network elements of the information and communication system. Makes minor mistakes.	Perfectly understands the architecture and general principles of functioning of hardware, software and software and hardware of the administered network, the procedure for configuring network elements of the information and communication system.
Learning outcomes: <i>Indicator:</i> ID-2 PK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when using modern standards when administering devices and software; using standard and external software and hardware to monitor the performance of the network infrastructure of the administered network.	Basically, correctly uses modern standards when administering devices and software; uses standard and external software and hardware to monitor the performance of the network infrastructure of the administered network. Makes minor mistakes.	Competently and independently uses modern standards in the administration of devices and software; uses standard and external software and hardware to monitor the performance of the network infrastructure of the administered network.
Learning outcomes: <i>Indicator:</i> ID-3 PK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when diagnosing failures and errors of network devices and software.	Confidently diagnoses failures and errors of network devices and software. Makes minor errors.	Diagnoses failures and errors of network devices and software with great efficiency.

Learning outcomes: <i>Indicator:</i> ID-4 PK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when carrying out routine maintenance on network devices and software of the infocommunication system.	Quite confidently carries out routine maintenance on network devices and software of the information and communication system. Makes minor mistakes.	Competently carries out routine maintenance on network devices and software of the information and communication system.
Learning outcomes: <i>Indicator:</i> ID-5 PK-6	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in the installation and configuration of system and application software necessary for the functioning of the IS in accordance with the work assignment, the implementation of standard design and parameterization of the IS in accordance with the regulations of the organization.	Quite confidently performs the installation and configuration of system and application software necessary for the functioning of the IS in accordance with the work assignment, carries out standard design and parameterization of the IS in accordance with the regulations of the organization. Makes minor mistakes.	Competently performs installation and configuration of system and application software necessary for the functioning of the IS in accordance with the work assignment, carries out standard design and parameterization of the IS in accordance with the regulations of the organization.
Competency: PK-7				
Learning outcomes: <i>Indicator:</i> ID-1 PK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding and using the basic principles, protocols and software cryptographic tools for ensuring the information security of network devices.	Generally correctly understands and uses the basic principles, protocols and software cryptographic tools for ensuring the information security of network devices. Makes minor mistakes.	Perfectly understands and uses the basic principles, protocols and software cryptographic tools for ensuring the information security of network devices.
Learning outcomes: <i>Indicator:</i> ID-2 PK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes in understanding the general principles of functioning and architecture of hardware, software, software and hardware of the administered network; protocols of the channel, network, transport and application layers of the model of interaction of open systems.	In general, he correctly understands the general principles of functioning and architecture of hardware, software, software and hardware of the administered network; protocols of the channel, network, transport and application layers of the model of interaction of open systems. Makes minor mistakes.	Perfectly understands the general principles of operation and architecture of hardware, software, software and hardware of the administered network; protocols of the channel, network, transport and application layers of the model of interaction of open systems.

Learning outcomes: <i>Indicator:</i> ID-3 PK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when using software, hardware and software and hardware to protect network devices from unauthorized access; configuring the parameters of modern software and hardware firewalls.	Quite confidently applies software, hardware and software and hardware to protect network devices from unauthorized access; adjusts the parameters of modern software and hardware firewalls. Makes minor mistakes.	With great efficiency, it uses software, hardware and software and hardware means to protect network devices from unauthorized access; adjusts the parameters of modern software and hardware firewalls.
Learning outcomes: <i>Indicator:</i> ID-4 PK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when connecting and configuring modern remote access security tools (operating systems and specialized protocols); working with control and measuring hardware and software.	Confidently connects and configures modern remote access security tools (operating systems and specialized protocols); works with control and measurement hardware and software. Makes minor mistakes.	Competently connects and configures modern remote access security tools (operating systems and specialized protocols); effectively works with control and measurement hardware and software.
Learning outcomes: <i>Indicator:</i> ID-5 PK-7	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when installing additional software products to ensure remote access security and parameterization.	Generally correctly installs additional software products to ensure remote access security and parameterization. Makes minor errors.	Competently and independently installs additional software products to ensure the security of remote access and their parameterization.
Competency: PK-8				
Learning outcomes: <i>Indicator:</i> ID-1 PK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when following the instructions for the installation and operation of the managed network devices and software; the regulations for carrying out preventive maintenance on the administered information and communication system.	In general, correctly follows the instructions for the installation and operation of the administered network devices and software; the regulations for preventive maintenance on the administered information and communication system. Makes minor mistakes.	Perfectly complies with the instructions for the installation and operation of the managed network devices and software; the regulations for preventive maintenance on the administered information and communication system.
Learning outcomes: <i>Indicator:</i> ID-2 PK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when installing operating systems of network devices; monitoring of managed network devices; using standard data recovery procedures, working with archiving	Generally correctly installs the operating systems of network devices; monitors administered network devices; uses standard data recovery procedures, works with backup	Correctly and independently installs the operating systems of network devices; monitors the administered network devices; uses

		servers and operating system management tools; scheduling backup of operating systems of network devices; disassembling and assembling administered network devices.	servers and operating system management tools; schedules backups of network device operating systems; disassembles and reassembles administered network devices. Makes minor errors.	standard data recovery procedures, works with archiving servers and operating system management tools; draws up a backup schedule for the operating systems of network devices; disassembles and assembles the administered network devices.
Learning outcomes: <i>Indicator:</i> ID-3 PK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when using modern tools for monitoring the performance of the administered network; using regulatory and technical documentation in the field of information and communication technologies to solve problems.	Uses modern means of monitoring the performance of the administered network quite confidently; uses regulatory and technical documentation in the field of information and communication technologies to solve problems. Makes minor mistakes.	Uses modern means of monitoring the performance of the administered network with great efficiency; uses regulatory and technical documentation in the field of information and communication technologies to solve problems.
Learning outcomes: <i>Indicator:</i> ID-4 PK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes when rebooting the operating systems of network devices, planning the schedule for copying the software of the network infocommunication system, restoring parameters using archiving servers and management tools of specialized operating systems of network equipment.	In general, it correctly performs work on rebooting the operating systems of network devices, planning the schedule for copying the software of the network infocommunication system, restoring parameters using archiving servers and management tools of specialized operating systems of network equipment. Makes minor errors.	Perfectly performs work on rebooting the operating systems of network devices, planning the schedule for copying the software of the network infocommunication system, restoring parameters using archiving servers and management tools for specialized operating systems of network equipment.
Learning outcomes: <i>Indicator:</i> ID-5 PK-8	Unable to complete tasks related to this competency achievement indicator.	Makes mistakes during routine maintenance of equipment in accordance with the manufacturer's recommendations.	In general, it correctly conducts routine maintenance of equipment in accordance with the manufacturer's recommendations. Makes minor mistakes.	With great efficiency, it carries out routine maintenance of equipment in accordance with the manufacturer's recommendations.

8.2 Criteria for assessing competencies at the state exam

The grade **"excellent"** is given to a student if the student has shown the presence of deep, exhaustive knowledge of all questions of the ticket; competent and logically harmonious construction of answers to the questions of the ticket and additional questions; demonstrated confident and correct answers to questions on the application of the acquired knowledge in engineering activities.

As a rule, the grade "excellent" is given to students who have mastered the relationship of the basic concepts in their meaning for the acquired profession, who have shown creative abilities in understanding, presentation and use of educational material.

A grade of **"good"** is given to a student if the student has shown that he has solid and sufficiently complete knowledge of all the questions on the ticket; made minor errors in the answers, which caused comments and corrections from the commission members; demonstrated the correct answers to questions on the application of the acquired knowledge in networks and communication systems.

As a rule, the grade "good" is given to students who have shown the systematic nature of knowledge and are able to independently replenish and update it in the course of further educational work and professional activity.

A grade of **"satisfactory"** is given to a student if the student has shown solid knowledge of all questions on the ticket; presentation of answers to the questions on the ticket and additional questions with errors, confidently corrected after additional questions; the need for leading questions; demonstrated the correct answers to questions on the application of knowledge.

As a rule, the grade "satisfactory" is given to students who have made errors in the answer at the exam and in the performance of exam tasks, but have the necessary knowledge to eliminate them under the guidance of the teacher.

An **"unsatisfactory" grade** is given to a student if the student does not meet the requirements for a "satisfactory" grade.

8.3 Description of rating scales

The state exam is evaluated on a 5-point system.