

Документ подписан простой электронной подписью
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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
Advanced Engineering
A.A. Porokhnya

DISCIPLINE ASSESSMENT TOOLS FUND
"Intelligent Control System"

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	6

Introduction

1. Purpose

The fund of assessment tools for the discipline "Intelligent Management System" is designed for an objective assessment of the level of competence formation.

2. FOS is an appendix to the program of the discipline "Intelligent Control System".

3. Developer N.Y. Bratchenko, Associate Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering, Candidate of Physical and Mathematical Sciences, Associate Professor.

4. An examination of the FOC was carried out.

Members of the expert group:

Chairman: N.Y. Bratchenko, Chairman of the CMT of the Institute of Advanced Engineering, Associate Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering.

Members of the Commission:

V.P. Mochalov, Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering.

S.V. Melnikov, Senior Researcher of the Interdisciplinary Training and Research Center for Agricultural Technologies, Associate Professor of the Department of Digital, Robotic Systems and Electronics of the Institute of Advanced Engineering.

Representative of the employer's organization:

Mironov V.A., General Director of Orintex LLC.

Expert opinion: The FAT for the discipline allows you to assess the level of competence formation. Start approbation.

5. The validity period of the FAT is determined by the period of implementation of the educational program.

Description of indicators and assessment criteria at various stages of their formation, description of assessment scales

Competency(s), indicator(s)	Levels of competence formation(s),			
	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
Competence: PC-1				
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-1PK-1 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.	Does not know 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.	Partially knows 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.	Knows 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.	Perfectly and confidently knows 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 in the discipline (module): <i>Indicator:</i> ID-2PK-1 analyzes statistical parameters of traffic, develops solutions for operational reconfiguration of the	It does not study the statistical parameters of traffic, develops solutions for the operational reconfiguration of the network, changing the parameters of the	To some extent, it studies the statistical parameters of traffic, develops solutions for the operational reconfiguration of the network, changing the	Studies the statistical parameters of traffic, develops solutions for the operational reconfiguration of	Independently and confidently examines the statistical parameters of traffic, develops solutions for the

network, changing the parameters of the switching subsystem, network platforms, for the use of equipment of new technologies; changing and adjusting the parameters of the switching subsystem, transport networks and data transmission networks, for organizing new and expanding existing communication directions.	switching subsystem, network platforms, for the use of equipment of new technologies; changing and adjusting the parameters of the switching subsystem, transport networks and data transmission networks, for the organization of new and expansion of existing communication directions.	parameters of the switching subsystem, network platforms, for the use of equipment of new technologies; changing and adjusting the parameters of the switching subsystem, transport networks and data transmission networks, for organizing new and expanding existing communication directions.	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 switching subsystem, transport networks and data transmission networks, for organizing new and expanding existing communication directions.	prompt reconfiguration of the network, changing the parameters of the switching subsystem, network platforms, for the use of equipment of new technologies; changing and adjusting the parameters of the switching subsystem, transport networks and data transmission networks, for organizing new and expanding existing communication directions.
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-3PK-1. analyzes the statistics of the main performance indicators of radio systems and data transmission systems, develops measures to maintain them at the required level, calculates the capacity of telecommunications	Does not understand and does not apply statistics of the main performance indicators of radio systems and data transmission systems, develops measures to maintain them at the required level, calculates the capacity of telecommunications networks.	Insufficiently understands and applies statistics on the main performance indicators of radio systems and data transmission systems, develops measures to maintain them at the required level, calculates the capacity of telecommunication	Understands and partially applies the statistics of the main performance indicators of radio systems and data transmission systems, develops measures to maintain them at the required level, calculates the	Understands and confidently applies statistics on the main performance indicators of radio and data transmission systems, develops measures to maintain them at the required level, and calculates the

networks.		networks.	capacity of telecommunications networks.	capacity of telecommunications networks.
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-4PC-1 develops communication schemes and integration of new network elements, builds and expands the switching subsystem and network platforms; performs work on switching equipment, deploys service platform equipment, equipment of new technologies on the network, fulfills plans to expand existing equipment of network platforms and new technologies.	Does not develop 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	Partially 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, does not fulfill plans for the expansion of existing equipment of network platforms and new technologies.	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 to expand existing equipment of network platforms and new technologies.	Independently and competently 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, qualitatively fulfills plans for the expansion of existing equipment of network platforms and new technologies.
Competency: PK-2				
Learning outcomes in the discipline (module):	Unable to complete tasks related to this	Performs tasks at the reproductive level	Performs tasks related to this	Fully performs tasks related to

<i>Indicator:</i> ID-1PK-2 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 information and communication equipment.	competency achievement indicator	related to this indicator of competence achievement	indicator of competence achievement in standard situations, making minor mistakes	this indicator of competence achievement, including in non-standard situations
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-2PK-2 complies with the requirements of programs and methods for conducting experimental tests of communication facilities and systems (information and communication equipment).	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-3PC-2 works with software used in the processing of information of infocommunication systems and their components,	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations

technical means of data collection and processing, with various information systems and databases.				
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-4PK-2 controls the quality indicators of the operation of information and communication equipment in accordance with their standard indicators.	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations
Learning outcomes in the discipline (module): <i>Indicator:</i> ID-5PK-2 to conduct experimental studies on the existing programs and methods of testing objects and communication systems (information and communication equipment) in order to assess their quality performance	Unable to complete tasks related to this competency achievement indicator	Performs tasks at the reproductive level related to this indicator of competence achievement	Performs tasks related to this indicator of competence achievement in standard situations, making minor mistakes	Fully performs tasks related to this indicator of competence achievement, including in non-standard situations

ASSESSMENT TOOLS FOR CHECKING THE LEVEL OF COMPETENCE FORMATION

Job Number	Correct answer	Content of the question	Competence
Semester <u>6</u> .			
1.	b	What is the main purpose of knowledge representation in an intelligent information system? (a) Increased storage capacity b) Providing easy access to knowledge for decision-making and conclusions c) Data encryption to protect information	PC-1, PC-2
2.	a	What is a semantic web in general? a) A directed graph whose vertices are concepts and whose arcs are the relations between them b) A table with a set of statistical data c) Linear Instruction List for the Processor	PC-1, PC-2
3.	in	What types of relationships must be present for a network to be considered semantic? a) "Beginning – end", "entrance – exit" b) "Plus – minus", "more – less" c) "Property – value", "class – class element", "example of a class element"	PC-1, PC-2
4.	a	What are semantic networks called in which there is only one type of relationship? (a) Homogeneous b) Binary c) Simple	PC-1, PC-2
5.	b	What type of relationship in the semantic network does the element-set relationship belong to? a) Quantitative b) Relations "part – whole" c) Spatial	PC-1, PC-2
6.	b	What is the main task of finding a solution in a knowledge base based on semantic networks? a) Removing Extra Graph Vertices b) Finding a network fragment that corresponds to the question posed c) Determination of weight coefficients of all arcs	PC-1, PC-2
7.	b	In what software environment is practical work No2 on fuzzy logic performed? a) Visual Prolog b) Fuzzy Logic Toolbox (as part of MATLAB) c) Microsoft Excel	PC-1, PC-2
8.	a	What is a "linguistic variable" (LP)?	PC-1,

		a) A named variable that takes values from a set of symbolic quantities (terms) b) A text string in the program code c) Variable responsible for translation from one language to another	PC-2
9.	in	What is the process of specifying a term set for a fuzzy linguistic variable called? (a) Defuzzification b) Activation c) Fuzzification	PC-1, PC-2
10.	b	Which editor in Fuzzy Logic Toolbox does I use to set ownership functions? a) Rule Editor b) Membership Function Editor (MFE) c) FIS Editor	PC-1, PC-2
11.	a	What is the operation of obtaining a clear quantitative value of the result in fuzzy logic called? (a) Defuzzification b) Activation c) Accumulation	PC-1, PC-2
12.	b	What belong functions are available for output variables in the Sugeno algorithm? a) Only Gaussian and triangular b) Linear or constant only c) Any of the 11 built-in types	PC-1, PC-2
13.	b	What type of programming languages is Prolog in? a) Imperative b) Declarative c) Low-level object-oriented	PC-1, PC-2
14.	a	What is the basis of the Prolog language? (a) Predicate calculus and the method of resolution b) Theory of neural networks c) Boolean algebra and truth tables	PC-1, PC-2
15.	b	What does a Prolog program look like? a) As a sequence of instructions for the processor b) As a set of logical descriptions that define the goal c) As a graphical scheme of the algorithm	PC-1, PC-2
16.	in	What environment is used to perform the work of building logical models (Work No3)? a) MATLAB b) Python IDE c) Visual Prolog	PC-1, PC-2

17.	a	What is called "GOAL" in Prolog terminology? a) The purpose of the program for which it was written b) Starting Point of Entry c) Variable that stores the result of addition	PC-1, PC-2
18.	b	What is the inference mechanism in the Prolog language based on? a) On a random search of options b) On the comparison of samples and the extraction of known information c) Teaching the system by examples	PC-1, PC-2
19.	b	In what form is knowledge presented in production systems? a) In the form of hierarchical trees b) In the form of "IF-THEN" rules c) In the form of coefficient matrices	PC-1, PC-2
20.	a	What is the part of the "IF" rule in the production system called? a) Parcel b) Conclusion c) Core	PC-1, PC-2
21.	b	What are the main components of a production system? a) Monitor, keyboard, database b) Rule Base, Fact Base (Working Memory), and Inference Engine c) Neuron, synapse, combiner	PC-1, PC-2
22.	a	What is a "conflict set" in a production system? a) A set of rules that can be applied at this stage of the withdrawal b) Error in the program code c) Situation when the database of facts is empty	PC-1, PC-2
23.	b	What is the name of the method of obtaining facts that goes from data to the goal? a) Reverse Inference b) Direct withdrawal c) Fuzzification	PC-1, PC-2
24.	b	Who is the author of the concept of the frame model of knowledge representation? a) Alan Colmeroy b) Marvin Minsky c) Lotfi Zadeh	PC-1, PC-2
25.	a	What is a "slot" in a frame model? a) Structural element of the frame, containing information about the characteristics of the object b) The name of the frame itself	PC-1, PC-2

		c) Neural Network Training Method	
26.	b	What is the name of a specific implementation of a frame that describes the current state of an object? a) Sample frame b) Frame Instance c) Frame Class	PC-1, PC-2
27.	a	What is the "matryoshka principle" in frame representations? a) The slot value can be a set of slots of a lower level b) Ability to copy frames c) Automatic deletion of unused data	PC-1, PC-2
28.	b	What are neural networks in artificial intelligence systems based on? a) On logical deductions from the rule base b) Attempts to reproduce the work of the human nervous system c) Storing data in the form of graphs	PC-1, PC-2
29.	in	What are the elements of a mathematical model of a neuron? a) Frame, slot, space b) Sending, output, production c) Synapses, adder and nonlinear transducer	PC-1, PC-2
30.	a	What is the training of a neural network in the first place? a) In the change in the "strength" (weight coefficients) of synaptic connections between neurons b) In writing new rules "IF-THEN" c) Increasing the number of slots in frames	PC-1, PC-2
31.		What is the main purpose of knowledge representation in intelligent information systems?	PC-1, PC-2
32.		Define a semantic network as a model of knowledge representation.	PC-1, PC-2
33.		What are the three mandatory types of relationships that should be present in a semantic web?	PC-1, PC-2
34.		What is the difference between homogeneous and heterogeneous semantic networks?	PC-1, PC-2
35.		What are the main types of connections (relations) that are most often used in semantic graphs.	PC-1, PC-2
36.		What is a linguistic variable and what does its term set consist of?	PC-1, PC-2
37.		Describe the essence of the fuzzification and defuzzification processes in fuzzy logic.	PC-1, PC-2
38.		What editors are included in the Fuzzy Logic Toolbox in MATLAB?	PC-1,

			PC-2
39.		What is the difference between Mamdani and Sugeno fuzzy inference algorithms?	PC-1, PC-2
40.		Why is Prolog called a declarative programming language?	PC-1, PC-2
41.		What is the mathematical basis of the Prolog language?	PC-1, PC-2
42.		What role does the "GOAL" section play in the structure of the Prolog program?	PC-1, PC-2
43.		What principle is the inference mechanism in a logical programming language based on?	PC-1, PC-2
44.		Describe the structure of the production rule "IF-THEN" (premise and conclusion).	PC-1, PC-2
45.		What are the three main components of a production system?	PC-1, PC-2
46.		What is the difference between forward and inverse inference in production models?	PC-1, PC-2
47.		What is a "frame" in Marvin Minsky's concept and what is its structure?	PC-1, PC-2
48.		What are "slots" and "spaces" in the frame model?	PC-1, PC-2
49.		What are the main mathematical elements of an artificial neuron model?	PC-1, PC-2
50.		What is the process of training a neural network in terms of changing its internal parameters?	PC-1, PC-2

Description of the grading scale

Students' progress in each discipline is assessed during current control and intermediate certification.

Rating assessment of knowledge is not provided.

Criteria for assessing competencies

An "excellent" grade is given to a student if he/she fully and accurately performs the tasks of the assessment tools in the discipline related to this competence (indicators of competence achievement), while demonstrating at a high level the ability to solve standard and non-standard applied practical problems.

A grade of "good" is given to a student if he/she, making minor mistakes, performs the tasks of assessment tools in the discipline related to this competence (indicators of competence achievement), while demonstrating at an average level the ability to solve only standard applied practical problems.

A "satisfactory" grade is given to a student if he/she performs the tasks of assessment tools in the discipline related to this competence (indicators of competence achievement), while demonstrating the ability to solve standard applied practical problems at a minimum level, making mistakes, which are corrected with the help of the teacher's leading questions.

An "unsatisfactory" grade is given to a student if he/she, performing the tasks of the assessment tools in the discipline, does not reach the minimum level of competence formation (indicators of competence achievement), while not demonstrating the ability to solve standard applied practical problems, makes gross mistakes that he cannot correct even with the help of leading questions from the teacher.