

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION  
Federal State Autonomous Educational Institution  
higher education  
NORTH CAUCASIAN FEDERAL UNIVERSITY

**I APPROVE**

Dean of the Faculty of Mathematics  
and computer science named after  
Professor N.I. Chervyakov,  
Candidate of Physical and  
Mathematical Sciences, Associate  
Professor  
Grobova T.A.

**ASSESSMENT TOOLS FUND FOR DISCIPLINE**  
**Signal and System / Сигналы и системы**

Speciality  
Specialization  
Year of commencement of studies  
Form of study  
It is implemented in semesters

Mathematics and Computer Science  
Training Program for Electronic Information  
2026  
full-time  
3

## Introduction

1. Purpose: The assessment toolkit is designed to provide a methodological basis for organizing and conducting ongoing assessments in the course "Signal and System / Сигналы и системы." Ongoing assessment in this course is a systematic method for assessing students' knowledge, skills, and abilities. The objectives of ongoing assessments are to obtain initial information on the progress and quality of competencies acquired, as well as to encourage regular, targeted student work. This work is intended to develop a specific level of competencies.

2. FOS is an appendix to the program of the discipline "Signal and System / Сигналы и системы"

3. Developer: Maria Anatolyevna Lapina, Associate Professor of the Department of Computational Mathematics and Cybernetics.

4. An examination of the organophosphorus compounds was carried out.

Members of the expert group:

Chairman

Babenko M. G. manager department computational mathematics and cybernetics.

Members of the commission:

Peleshenko V.S. associate professor departments computational mathematics and cybernetics.

Peleshenko T. A. associate professor departments computational mathematics and cybernetics.

Representative employer organization Kornienko WITH. A. boss management branch of the Federal State Unitary Enterprise "Main Radio Frequency Center" in the Southern and North Caucasian Federal Districts.

Expert opinion: the fund of assessment tools corresponds to the educational program for the specialty 02.04.01 Mathematics and computer science specialization " Training Program for Electronic Information " and is recommended for conducting ongoing monitoring of academic performance and midterm assessment of students .

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

**1. Description of the criteria for assessing competence at various stages of its development, description of assessment scales**

| Competence ( ii ),<br>indicator (s)                                                                                                                                                | Levels of development competencies ( y )                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                           |
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|                                                                                                                                                                                    | The minimum<br>level has not<br>been reached<br>(unsatisfactory)<br>2 points                                                                                                                                                                                                                                                                                                       | Minimum<br>level<br>(satisfactorily<br>)<br>3 points                                                                                                                                                                                                                                                                                                                                      | Average<br>level<br>(Fine)<br>4 points                                                                                                                                                                                                                                                                                                                                 | High<br>level<br>(Great)<br>5 points                                                                                                                                                                                                                                                                                                                                                      |
| <b>Competency: PC-8. Capable of participating in the management of projects for the creation of information systems and software packages at various stages of the life cycle.</b> |                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                           |
| ID-1 <sub>PC-8</sub><br>Manages the development, development and maintenance of information systems and software systems                                                           | Does not select :<br>- the content of the stages of building computer networks; - reference models of interaction open systems; - principles construction and operation of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks | Selects with gross errors : - the content of the stages of building computer networks; - reference models of interaction open systems; - principles construction and operation of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks | Selects: - the content of the stages of building computer networks; - reference models of interaction open systems; - principles construction and operation of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks | Selects and can explain :<br>- the content of the stages of building computer networks; - reference models of interaction open systems; -principles construction and operation of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks |
| ID-2 <sub>PC-8</sub><br>Knows and applies software development trends in his/her professional activities                                                                           |                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Competency: PC-9 Able to take into account knowledge of the problems and trends in the development of the software market in professional activities</b>                        |                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                           |

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>ID-1 <small>PC-9</small><br/> Selects software for their professional activities, taking into account market development trends.</p> <p>ID-2 <small>PC-9</small><br/> Takes into account the development trends of the software market and applies these development trends in professional activities</p> | <p>Does not know how to use network tools for data exchange, including the use of the global information system Internet networks ; develops network projects using basic technologies; - evaluates the performance of network projects; explores the characteristics network activity created projects. Does not choose the optimal way to solve problems professional activities taking into account the current state and trends development networks and systems transmission of information.</p> | <p>At a low level, it uses networking tools to exchange data, including using the global information system Internet networks ; develops network projects using basic technologies; - evaluates the performance of network projects; explores the characteristics network activity created projects. chooses a non-optimal way to solve problems professional activities taking into account the current state and trends development networks and systems transmission of information.</p> | <p>uses network tools to exchange data, including using the global information Internet networks ; develops network projects using basic technologies; - evaluates the performance of network projects; explores the characteristics network activity created projects. chooses the optimal way to solve problems professional activities taking into account the current state and trends development networks and systems transmission of information.</p> | <p>Selects and uses network tools for data exchange, including the use of global information Internet networks ; develops network projects using basic technologies; - evaluates the performance of network projects; explores the characteristics network activity created projects. chooses the best way to solve problems professional activities taking into account the current state and trends development networks and systems transmission of information.</p> |
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The assessment of the level of development of competence in the discipline is carried out on the basis of the "Regulations on the current monitoring of academic performance and midterm assessment of students in higher education programs - bachelor's programs, specialist programs, master's programs - at the federal state autonomous educational institution of higher education

"North Caucasus Federal University" in the current version.

## ASSESSMENT TOOLS FOR CHECKING THE LEVEL OF DEVELOPMENT OF COMPETENCIES

| Task number | Correct answer | Content question                                                                                                                                                                                              | Competence    |
|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 1.          | a,d            | Which of the following addresses can be used as the default gateway for the network 172.19.255.0/25?<br>a) 172.19.255.126<br>b)172.19.255.128<br>c)172.19.255.129<br>d) 172.19.255.16<br>e)<br>172.19.255.130 | PC- 8<br>PC-9 |
| 2.          | a, b , c       | Which of the following addresses can be used as the default gateway for network 172.16.8.0/22?<br>a) 172.16.8.2<br>b) 172.16.11.1<br>c) 172.16.10.255<br>d) 172.16.12.1<br>e) 172.16.12.255                   | PC- 8<br>PC-9 |
| 3.          | a              | What subnet mask prefix should I use? For discharge united With points from the perspective of address space routing 1039 workers stations?<br>a) /21<br>b) /22<br>c) /30<br>d) /24                           | PC- 8<br>PC-9 |
| 4.          | c              | Which prefix masks subnets must be used For discharge united With points in terms of routing the address space to 511 workstations ?<br>a) /24<br>b) /26<br>c) /22                                            | PC- 8<br>PC-9 |

| Task number | Correct answer | Content question                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Competence    |
|-------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|             |                | d) /23                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |
| 5.          | b,d            | What subnet mask prefix should be used to allocate a single subnet mask for routing purposes? address spaces Not less than 127 workstations?<br>a) /26<br>b) /24<br>c) /25<br>d) /22                                                                                                                                                                                                                                                                                   | PC- 8<br>PC-9 |
| 6.          | a, b , e       | Select the functions that an L2 switch performs in a LAN<br>a) receives, processes and forwards Ethernet frames<br>b) provides replication and distribution of broadcast frames<br>c) processes network and transport layer headers<br>d) configures network devices to segment the physical layer topology into dedicated (isolated) segments<br>e) ensures the functioning of protocols and technologies for the implementation of a fault-tolerant network topology | PC- 8<br>PC-9 |
| 7.          | c,d            | Select the functions that a hub performs on a local network<br>a) divides net on isolated segments<br>b) enables physical connections to operate in Full - Duplex mode<br>c) enables physical connections to operate in Half - Duplex mode<br>d) performs retransmission electrical signals between interfaces<br>e) performs analysis headings channel level                                                                                                          | PC- 8<br>PC-9 |
|             |                | Select from the list below the disadvantages of using hubs in a network.<br>a) Not divides network on domains collisions                                                                                                                                                                                                                                                                                                                                               | PC- 8<br>PC-9 |

| Task number | Correct answer | Content question                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Competence    |
|-------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 8.          | a, c , d       | b) absence blocking distribution broadcast traffic<br>c) no blocking of uncontrolled distribution of unicast traffic<br>d) there is no possibility to analyze the headers of the data link layer protocols<br>e) there is no possibility to analyze application layer protocol headers                                                                                                                                                                                                                                             |               |
| 9.          | abf            | Select the functions that a L3 router performs in a local network<br>a) performs analysis of data link layer protocol headers<br>b) analyzes network layer protocol headers<br>c) analyzes application layer protocol headers<br>d) performs blocking forwarding IP packets between subnets in a local network<br>performs blocking IP forwarding packages between local network And publicly accessible networks<br>f) generates a routing table based on configuration parameters and information from dynamic routing protocols | PC- 8<br>PC-9 |
| 10.         | b              | Which of the following network addresses contains the network addresses 10.8.0.0/25, 10.8.0.128/26, 10.8.1.0/24, 10.8.2.128/25?<br>a) 10.8.0.0/24<br>b) 10.8.0.0/22<br>c) 10.8.0.0/23<br>d) 10.8.1.0/24                                                                                                                                                                                                                                                                                                                            | PC- 8<br>PC-9 |
| 11.         | a              | Which of the following network addresses contains the network addresses 10.100.1.0/26, 10.100.0.128/25, 10.100.3.0/24, 10.100.2.192/27?<br>a) 10.100.0.0/22                                                                                                                                                                                                                                                                                                                                                                        | PC- 8<br>PC-9 |

| Task number | Correct answer | Content question                                                                                                                                                                                                                | Competence    |
|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|             |                | b)10.100.0.0/24<br>c) 10.100.0.0/23<br>d)10.100.2.0/23                                                                                                                                                                          |               |
| 12.         | ad             | Which of the following network addresses contains all the addresses of the networks 45.128.4.0/22, 45.128.16.0/21, 45.128.1.0/24, 45.128.3.128/30?<br>a) 45.128.0.0/19<br>b)45.128.0.0/22<br>c)45.128.0.0/21<br>d)45.128.0.0/16 | PC- 8<br>PC-9 |
| 13.         | c              | What is the maximum number of unique networks with a /25 mask prefix that can be created by subdividing the 10.0.0.0/8 network?<br>a) 256<br>b)65536<br>c) 131072<br>d)16777216                                                 | PC- 8<br>PC-9 |
| 14.         | a              | What is the maximum number of unique networks with a mask prefix of /26 that can be created by subdividing the network 172.16.0.0/22?<br>a) 16<br>b) 256<br>c)1024<br>d)4                                                       | PC- 8<br>PC-9 |
| 15.         | b              | What is the maximum number of unique networks with a mask prefix of /22 that can be created by subdividing the network 62.16.128.0/17?<br>a) 256<br>b) 32<br>c) 64<br>d) 16                                                     | PC- 8<br>PC-9 |
|             |                | What is the maximum number of unique networks with a /30 mask prefix that can be created by subdividing the 10.255.255.0/24 network?                                                                                            | PC- 8<br>PC-9 |

| Task number | Correct answer | Content question                                                                                                                                                                                                                      | Competence    |
|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 16.         | a              | a) 64<br>b) 32<br>c) 256<br>d) 8                                                                                                                                                                                                      |               |
| 17.         | b              | What is the maximum number of unique networks with a mask prefix of /29 that can be created by subdividing the network 10.90.0.0/19?<br>a) 512<br>b) 1024<br>c) 65536<br>b) 4096                                                      | PC- 8<br>PC-9 |
| 18.         | a              | Is it possible to split the 192.168.32.0/21 network? so that there are three unique networks with the mask prefix /24, five networks with the prefix /26, and seven networks with the prefix /29?<br>a) Yes, Can<br>b) No, impossible | PC- 8<br>PC-9 |
| 19.         | b              | Is it possible to split the 192.168.32.0/22 network? so that there are three unique networks with the mask prefix /24, five networks with the prefix /26, and seven networks with the prefix /29?<br>a) Yes, Can<br>b) No, impossible | PC- 8<br>PC-9 |
| 20.         | b              | Is it possible to split the 192.168.64.0/23 network? so that there are two unique networks with mask prefix /24, three networks with prefix /26 and seven networks with the prefix /29?<br>a) Yes, Can<br>b) No, impossible           | PC- 8<br>PC-9 |
| 21.         | a              | Is it possible to split the 192.168.0.0/24 network? so that there are three unique networks with the mask prefix /27, five networks with the prefix /29, and six networks with the prefix /30?<br>a) Yes, Can                         | PC- 8<br>PC-9 |

| Task number | Correct answer | Content question                                                                                                                                                                                                                                                                                                                                                                                  | Competence    |
|-------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|             |                | b) No, impossible                                                                                                                                                                                                                                                                                                                                                                                 |               |
| 22.         | a              | Can whether divide net 192.168.64.0/21 thus , to turned out five unique networks With mask prefix /24, eight networks with prefix /26 and eight networks with prefix /29?<br>a) Yes, Can<br>b) No, impossible                                                                                                                                                                                     | PC- 8<br>PC-9 |
| 23.         | b              | Is the transfer of data between two network nodes using the IP protocol a connection-oriented interaction?<br>a) Yes<br>b) No                                                                                                                                                                                                                                                                     | PC- 8<br>PC-9 |
| 24.         | c              | What contains field Protocol V IP header package?<br>a) Code protocol, which transmits route information<br>b)Code protocol, which necessary use to transmit data in this packet<br>c) Code protocol, which encapsulated V IP packet<br>d)Version protocol transport layer                                                                                                                        | PC- 8<br>PC-9 |
| 25.         | b              | Check on integrity Which parts IP package does it include checksum calculation?<br>a) data only<br>b) only the title c) title<br>And data<br>d) title top level                                                                                                                                                                                                                                   | PC- 8<br>PC-9 |
| 26.         | abc            | How is IP information generated? destination address?<br>a) the user or software is using IP address V quality original data, i.e. they know it in advance<br>b) IP address appointments Maybe contain V answer DNS servers<br>c) The destination IP address may be contained in the response to an RARP request.<br>d) Destination IP address may be contained in the response to an ARP request | PC- 8<br>PC-9 |

| Task number | Correct answer | Content question                                                                                                                                                                                                                                                                                             | Competence    |
|-------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| 27.         | a              | For what kind goals is used flag "SYN"?<br>a) For establishments TCP connections<br>b) For instructions on urgency delivery information contained in a TCP segment<br>c) For informing reception sides about attack<br>d) For recovery suddenly broken connection                                            | PC- 8<br>PC-9 |
| 28.         | c              | For what kind goals is used flag "FIN"?<br>a) to restore an unexpectedly broken connection<br>b) For instructions on again transmitted data<br>c) to inform the remote party that the connection has been completed<br>d) O switching on Finnish language                                                    | PC- 8<br>PC-9 |
| 29.         | a              | For what kind goals is used flag "RST"?<br>a) For emergency gap connections<br>b) For informing reception sides about attack<br>c) to restore an unexpectedly broken connection<br>d) For instructions on again transmitted data                                                                             | PC- 8<br>PC-9 |
| 30.         | b              | If the received TCP segment contains values Sequence header fields Number (SN) – 544, Acknowledgment Number (ACK NUM) – 298 and 152 byte of data. What will the receiving station indicate in the ACK NUM field of the TCP response segment?<br>a) 451<br>b) 697<br>c) 450<br>d) 696<br>e) No correct answer | PC- 8<br>PC-9 |

## **2. Description of the rating scale**

Under the rating system, student performance in each discipline is assessed through ongoing assessments and midterm assessments. The rating system for assessing student knowledge is based on a set of assessment activities (checkpoints) optimally spaced throughout the course. The principles of the rating system for assessing student knowledge are based on the requirements described in the Regulation on the Organization of the Educational Process Based on the Rating System for Assessing Student Knowledge at North Caucasus Federal University.

## **3. Competency assessment criteria**

The grade "Excellent" is awarded to a student if the student selects and can explain: - the content of the stages of building computer networks; - reference models of open system interactions; - principles of construction and operation of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks. Selects and uses network tools for data exchange, including using the global information network Internet; develops network projects using basic technologies; - evaluates the performance of network projects; examines the characteristics of the network activity of created projects. Selects the best way to solve professional problems, taking into account the current state and trends in the development of networks and information transmission systems.

A "good" grade is awarded to a student if he/she selects: - the content of the stages of building computer networks; - reference models of open systems interaction; - principles of building and functioning of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks. The student uses network tools for data exchange, including the use of the global information network Internet; develops network projects using basic technologies; - evaluates the performance of network projects; examines the characteristics of the network activity of created projects. Selects the optimal way to solve professional problems, taking into account the current state and trends in the development of networks and information transmission systems.

A "satisfactory" grade is given to a student if he/she selects with serious errors: - the content of the stages of building computer networks; - reference models of open system interactions; - principles of building and functioning of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks. At a low level, uses network tools for data exchange, including using the global information network Internet; develops network projects using basic technologies; - evaluates the performance of network projects; examines the characteristics of the network activity of created projects. Chooses a non-optimal way to solve problems of professional activity, taking into account the current state and trends in the development of networks and information transmission systems.

The grade "unsatisfactory" is given if the student: does not select: - the content of the stages of building computer networks; - reference models of open systems interaction; - principles of construction and functioning of information transmission systems and networks; typical structures and principles of organizing computer networks; basic telecommunication protocols; prospects for the development of computer networks. The student does not know how to use network tools for data exchange, including using the global information network Internet; develops network projects using basic technologies; - evaluates the operability of network projects; examines the characteristics of the network activity of the created projects. Does not choose the optimal way to solve problems of professional activity, taking into account the current state and trends in the development of networks and information transmission systems.