

**FEDERAL STATE BUDGET EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
"ROSTOV STATE MEDICAL UNIVERSITY" OF THE MINISTRY OF HEALTH OF THE
RUSSIAN FEDERATION**

FACULTY OF TREATMENT AND PREVENTION

Assessment materials

for the discipline

MEDICAL INFORMATICS AND STATISTICS

Speciality **05/31/01 General medicine**

2023

1. List of competencies formed by the discipline (in full or partially)*

general professional (OPK):

Code and name general professional competence	Achievement indicator(s) general professional competence
OPK-10. Able to solve standard problems of professional activity using information, bibliographic resources, medical and biological terminology, information and communication technologies, taking into account the basic requirements of information security	ID 1 OPK-10 Able to use modern information technologies in professional activities, taking into account the basic requirements of information security. ID 2 OPK-10 Able to solve standard problems of professional activity using information, bibliographic resources, medical and biological terminology

2. Types of assessment materials in accordance with formed competencies

Name competencies	Types of assessment materials	number of tasks for 1 competency
OPK-10	Closed tasks	25 with sample answers
	Open type tasks: Situational tasks Interview questions Add-on tasks	75 with sample answers

Instructions for tasks 1-4: Choose one correct answer.

Task 1. The device for electrotherapy with biofeedback belongs to the automated systems:

- A) therapeutic effects
- B) monitoring
- C) functional diagnostics
- D) expert systems

ANSWER:A)

Task 2. An interconnected set of means, methods and personnel used for storing, processing and issuing information in the interests of a given goal is called:

- A) information technology
- B) information system
- C) computer science
- D) unified information system in healthcare

ANSWER:B)

Task 3. Information technologies for compulsory health insurance as information technology belongs to the section of medical informatics:

- A) clinical
- B) laboratory
- C) organizational and managerial
- D) telemedicine

ANSWER: C)

Task 4. The process of collecting, processing and transmitting primary information to obtain information of new quality is called:

- A) information technology
- B) information system
- C) computer science
- D) cybernetics

ANSWER:A)

Instructions for tasks 5-: Choose several correct answers. Task 5.

Software protection of software products includes:

- A) startup password
- B) patent
- C) license
- D) copyright law
- E) user rights administration

ANSWER:A), E)

Task 6.

System base software includes:

- A) antivirus program
- B) operating system
- C) operating shell
- D) data archiving program
- E) network operating system

ANSWER:B), C), E)

Task 7.

System service software includes:

- A) antivirus program
- B) computer diagnostic program
- C) operating system
- D) data archiving program
- E) operating shell

ANSWER:A), B), D)

Task 8.

Legal protection of software products includes:

- A) startup password
- B) patent
- C) license
- D) electronic key
- E) copyright law

ANSWER:B), C), E)

Task 9.

Information technologies in medicine include:

- A) information technologies for managing medical institutions at various levels
- B) social insurance information technology
- C) information technologies for collecting and processing information to assess human health status
- D) computer-aided design information technologies

ANSWER:A), C)

Task 10.

Clinical informatics combines the following technologies:

- A) automated technologies for processing instrumental and laboratory data
- B) intelligent medical decision support systems
- C) mathematical modeling of medical processes
- D) information technologies for compulsory health insurance
- E) telemedicine technologies for remote consultation

ANSWER:A), B), C), E)

Task 11.

Medical instrumentation and computer systems include:

- A) medical device
- B) medical prescription information system
- C) software
- D) computing device

ANSWER:A), C), D)

Task 12.

Computer systems for processing medical images perform the following functions:

- A) storage of electrographic complexes on hard disks
othersdrives
- B) signal filtering
- C) geometric and gradient correction
- D) enhancing local contrasts and sharpness
- E) image restoration

ANSWER: B), C), D), E)

Task 13.

The modeling process in medicine includes the following elements:

- A) modeling object
- B) expert system
- C) subject
- D) information system
- E) model

ANSWER:A), C), E)

Task 14.

Classification of models depending on the time factor includes types of models:

- A) descriptive
- B) optimization

C) static
D) dynamic
ANSWER: C), D)

Task 15.

Participants in the development of the expert system:

- A) administrator
- B) expert
- C) Information system
- D) programmer
- E) knowledge engineer

ANSWER: B), D), E)

Task 16. Match the database type:

1. Hierarchical 2. Network 3. Relational and data organization structure: A. in the form of a table

B. arbitrary connections between information nodes

C. tree structure

ANSWER: 1-B, 2-B, 3-A

Task 17. Establish a correspondence between automated workstations:

1. Automated workstation of a cardiologist 2. Automated workstation of the chief psychiatrist of the region 3. Automated workstation of the head of the hospital medical service and their classification:

- A. administrative B. technological C. mixed

ANSWER: 1-B, 2-B, 3-A

Task 18. Establish a correspondence between the models:

1. Artificial lens of the eye 2. Artificial kidney 3. Scheme of blood supply to the heart and their classification according to the type of models in medicine:

- A. informational B. energy C. real

ANSWER: 1-B, 2-B, 3-A

Task 19. Establish a correspondence between the types of models in medicine:

1. Material 2. Energy 3. Mixed 4. Information

5. Biological and criteria for their use:

- A. model a function in the absence of external similarity B. describe an object using associative signs
- C. model the external similarity of an object and its function
- D. model diseases on biological objects D. have an external resemblance to the object being modeled

ANSWER: 1-D, 2-A, 3-B, 4-B, 5-D

Task 20. Establish correspondence between measures of information:

1. Syntactic 2. Semantic 3. Pragmatic and their characteristics: A. determines the semantic content

B. operates with anonymized information

B. determines the usefulness of information for achieving a goal

ANSWER:1-B, 2-A, 3-B

Task 21. Establish a correspondence between the classification of medical information systems (MIS) 1. Basic level MIS 2. MIS at the level of a medical institution 3. Federal MIS and their constituent elements:

A. medical instrument and computer systems

B. sectoral medical information systems C. personalized registers

ANSWER:1-A, 2-B, 3-B

Task 22. Match the name of the medical device:

1. Tomograph 2. Rheograph 3. Mechanical ventilation device 4. Biochemical analyzer 5. Physiotherapy device and classification of medical instrument and computer systems:

A. functional diagnostics B.

laboratory diagnostics

B. replacement of vital functions of the body D.

therapeutic effects

D. medical image processing

ANSWER:1-D, 2-A, 3-B, 4-B, 5-G

Task 23. Indicate the sequence of construction stages medical information system:

1. Purchase and modernization of application software

2. Implementation of a medical information system

3. Training of personnel and users of the information system

4. Construction of local computer networks, high-speed fiber-optical communication lines

5. Ensuring the operation of the medical information system, including warranty and post-warranty service

6. Purchase and installation of computer equipment and system software

7. **ANSWER:**4-6-1-3-2-5

Task 24. Arrange the stages of building models in the correct sequence:

1. Development and creation of the model

2. Statement of the problem, study of the modeling object

3. Computer experiment

4. Analysis of results

ANSWER:2-1-3-4

Task 25. Sequence of stages of building an expert system:

1. Formalization

2. Identification

3. Trial operation

4. Prototype development

5. Testing

6. Conceptualization

ANSWER:2-6-1-4-3-5

Addition tasks

Instructions for addition tasks: instead of a dash, write only one word.

Task 26. Program - a special kind _____ in the form of binary codes, perceived by the processor as commands to perform some actions.

Answer: information

Task 27. A program capable of infiltrating the codes of other programs, system memory areas, boot sectors and unauthorized distribution of its copies through various communication channels is called _____

Answer: virus

Task 28. Information about the world around us, which reduces the incompleteness of knowledge about objects and events in the environment, is called _____

Answer: information

Task 29. Entries in the patient's medical history that are stored in the registry and are not currently used are called _____

Answer: data

Task 30. In order to check the compliance of values with the specified criteria, MS Excel uses _____ functions

Answer: logical

Task 31. In order to calculate the mathematical expectation in MS Excel, the variance is used _____ functions

Answer: statistical

Task 32. Each computer connected to the Internet has its own unique ____

Answer: IP address

Task 33. The graphical interface created by the user for entering data into the database is called _____

Answer: Form

Task 34. Programs designed to losslessly compress one or more files into a single file or a series of files for ease of transfer and/or storage of data are called _____

Answer: Archivists

Task 35. The main difference between an expert system and applied computer programs is that the expert system manipulates _____, not data.

Answer: knowledge.

Interview tasks

Task 36. Define the science of computer science

Answer: Computer science is a science that studies the structure and general properties of information and information processes implemented using computer technology.

Task 37. Define medical informatics

Answer: Medical informatics is an applied branch of computer science that studies information and information processes in medicine and healthcare, implemented with the help of computer technology, telecommunications and medical measuring equipment.

Task 38. Define the science of cybernetics

Answer: Cybernetics is the science of control laws in various systems.

Task 39. Name the methods for protecting information.

Answer: Information protection methods are divided into software and legal.

Task 40. What is called a database.

Answer: A database is a collection of structured data in a specific subject area.

Task 41. List databases based on their data organization structure.

Answer: Based on the structure of data organization, there are hierarchical, relational and network databases.

Task 42. Name the classes of software products by area of use.

Answer: System, application software packages, programming technology tools.

Task 43. What is a slide called in Power Point?

Answer: A slide is a single "page" of a presentation that presents information using different layouts.

Task 44. Indicate the purpose of the templates in Power Point.

Answer: Templates are designed to facilitate slide design operations

Task 45. Name the type of graphic editor that is used to edit images during ultrasound examination.

Answer: Raster graphics editor.

Task 46. List the main characteristics of the information society.

Answer: The information society is characterized by the use of computers in all areas of activity, the automation of information processing in management, production and social spheres, and the production of information products.

Task 47. Define computer network throughput and name its units of measurement.

Answer: Bandwidth - the maximum amount of data transmitted by the network per unit of time, measured in Mbit/s.

Task 48.Name the functions of the operating system.

Answer: The operating system ensures the operation of all computer hardware devices and user access to them.

Task 49.List the functions of a network operating system.

Answer: collaboration of a group of users, use of large external memory, multi-threaded data processing.

Task 50.What type of graphic editor should be used to design a hospital.

Answer: Vector graphics editor.

Task 51.Basic functions of expert systems for monitoring the patient's condition.

Answer: continuous monitoring of the condition of patients for a long time, notification of critical conditions, accumulation and storage of information, automated forecast of the dynamics of the patient's condition.

Task 52.Main strategic objectives of using information technologies in medicine

Answer: improving the quality of medical care; reduction of management costs; increasing the level of qualifications of medical workers; increasing the level of information and reference services to the population.

Task 53.The main function of the dialog component of the expert system.

Answer: The dialog component of an expert system is necessary to create an interface with the user.

Task 54.What section of medical informatics does administrative and management information systems belong to?

Answer: organizational and managerial medical informatics.

Task 55.Which section of medical informatics includes information systems for compulsory health insurance?

Answer: organizational and managerial medical informatics.

Task 56.To which section of medical informatics do systems of medical and statistical recording of healthcare institutions belong?

Answer: organizational and managerial medical informatics.

Task 57.Define telemedicine.

Answer: Telemedicine is an applied area associated with the remote provision of medical care and the exchange of specialized information based on telecommunications technologies.

Task 58.Indicate the main areas of work of telemedicine centers. Answer: Main directions: clinical, educational, scientific research, organizational and methodological, information and communication.

Task 59. Which section of medical informatics includes automated systems for processing instrumental and laboratory studies?

Answer: Clinical informatics.

Task 60. What is the purpose of the knowledge base in a medical expert system?

Answer: The knowledge base stores long-term data from subject matter experts.

Task 61. Who creates the medical expert system database and what is it intended for.

Answer: The database is created by the doctor when answering questions from the expert system.

Task 62. What is the purpose of a database in a medical expert system?

Answer: To store initial and intermediate data of the currently being solved problem

Task 63. What models are distinguished by the method of presentation? Answer: subject and financial.

Task 64. What models in medicine are called mixed?

Answer: Mixture models model both the external similarity of an object and its function.

Task 65. To what class of models can visual aids in the classroom be classified?

Answer: These are training models.

Task 66. An artificial kidney machine is used for hemodialysis. What type of model can it be classified as?

Answer: This is a functional or energetic model.

Task 67. What information systems are used for pre-medical preventive examination of the population in order to identify risk groups and patients in need of further diagnosis of the condition?

Answer: Screening systems

Task 68. What type of models are artificial kidney devices and artificial lung ventilation devices?

Answer: These are functional or energetic models.

Task 69. List basic level medical information systems.

Answer: Information and reference systems, Advisory and diagnostic systems, Instrumentation and computer systems, Automated workstations for specialists.

Task 70. What is an expert system?

Answer: An expert system is a set of programs that accumulate the knowledge of specialists and replicate it to provide advice to less qualified users.

Task 71. Define a medical automated information system

Answer: A medical automated information system is a set of methods, tools and personnel designed to automate the work of a medical institution.

Task 72. To what class of automated workstations (AWS) can the workstation of the chief physician of a medical institution be classified?

Answer: Administrative.

Task 73. Why are personalized registers needed?

Answer: Personalized registers contain information about certain groups of patients and are intended to monitor the effectiveness of medical care provided to them and plan its volume and financing.

Task 74. What type of modeling does the psychologist use when asking the patient to imagine himself in a certain role and perform it?

Answer: These are game models.

Task 75. Which is the main telemedicine tool that allows you to exchange video, sound and information between remote objects.

Answer: video conference.

Task 76. List the levels of medical information systems (MIS) in accordance with the structure of healthcare.

Answer: 1. basic; 2. MIS treatment and preventive institutions; 3.

territorial; 4. federal.

Task 77. List the types of medical information.

Answer: 1. Alphanumeric. 2. Visual. 3. Sound. 4. Combined.

Task 78. Give a definition of an automated workstation for a specialist doctor.

Answer: A workplace equipped with computer technology, software and, if necessary, medical equipment for information support of professional tasks performed.

Task 79. List the distinctive features of medical information.

Answer: confidentiality, dynamic updating,
professional interpretation.

Task 80. Name three tasks that intelligent medical decision support systems perform.

Answer: Analysis, modeling and forecast.

Task 81. What class of automated workstations (AWS) can a radiologist's workstation be classified as?

Answer: technological.

Task 82. Define electronic health record.

Sample answer: Electronic medical history is a set of electronic personal medical records related to one person, stored within one medical organization.

Situational tasks

Problem 83.You are the head of the freshman group. The group curator asked you to help prepare a document that will reflect the students' performance during the session and calculate the average score for each. What program is most convenient to do this in?

Answer: MS Excel spreadsheet processor.

Problem 84.You have been working as a surgeon for 5 years, and during this time you have been maintaining an electronic database about the operations you performed and the outcomes of these operations. You have been asked to provide statistical data on the work you have done over 5 years. Which database object can be used in a database management system?

Answer: Report

Problem 85.A database of patients of a medical institution was created in a database management system. The database records contain namesakes. What field can be added to a database structure to uniquely identify patients, and what type of data should this field correspond to?

Answer: It is necessary to add the field "Medical history number". The field must be assigned the "Key" type.

Problem 86.You work at the reception desk of a clinic. You enter information about patients seeking an appointment with a doctor in an MS Access table, which contains the field "Doctor's name", "Patient's name", "Date of appointment". You need to find a patient named Shorokhov who came to the clinic on the 1st of any month. What database object can you use to do this?

Answer: Request

Problem 87.You have conducted scientific research and are preparing to present at a conference. What program will you use to visually present the results of your work?

Answer: Power Point presentation system

Problem 88.You have received a message by e-mail with a picture of Chinese characters attached to it. It is assumed that you do not know Chinese. Does this message contain information for you?

Answer: No, there is no information.

Problem 89.In a patient with chronic renal failure with decompensation of the kidneys to cleanse the blood of toxic products of exchange

substances An artificial kidney device was used. What type of medical simulation is used in this case?

Answer: This is an energetic (functional) medical model.

Problem 90. For a patient with lens clouding, an ophthalmologist performed a surgical replacement with an artificial lens, which is a laser lens. The implanted lens is identical in geometric, optical, and biomechanical properties to the natural lens of the eye. What type of medical simulation is used in this case?

Answer: This is a material (structural) medical model.

Problem 91. During an ultrasound examination of the patient's heart, the systolic ejection of blood from the left ventricle into the aorta and the heart rate were calculated. In the expert opinion, the patient's minute blood volume is automatically determined by multiplying two values. What type of mathematical modeling was used?

Answer: deterministic mathematical model.

Problem 92. The patient's SCORE scale was calculated total cardiovascular risk. Male gender, systolic blood pressure level of 160 mm Hg, history of smoking, blood cholesterol level of 8 mmol/l allowed us to determine the risk of death on the scale as high – 24%. What type of mathematical modeling was used?

Answer: probabilistic mathematical model.

Problem 93. The patient visited a general practitioner at the clinic. When filling out the medical history, the doctor used information technology - a personal computer not connected to the corporate network, a Word word processor, and a conclusion template. Is it possible to conclude that the doctor uses an automated specialist (therapist) place?

Answer: No. The doctor used a personal computer to automate the formatting of the text.

Problem 94. The patient visited a cardiologist at the clinic. An electrocardiogram was taken for the patient using an automated electrocardiograph, an expert report was drawn up, an entry was made into the electronic medical history on a personal computer connected to the corporate network, and a referral to a therapist was generated. Which module of the medical information system was used when the doctor performed his professional duties?

Answer: automated workstation for a cardiologist.

Problem 95. During a conversation with a doctor, the patient noticed that after visiting the quest and overcoming obstacles to exit the cave, his level of anxiety increased and his sleep was disturbed. What model of application methodology was used to organize the quest?

Answer: game model.

Problem 96. Due to the territorial distance from the clinic, the patient arranged and attended a remote consultation with a therapist online. The patient was diagnosed and treated. Name the type of information technology used.

Answer: Telemedicine consultation with a doctor was used.

Problem 97.The patient contacted the clinic’s reception desk and asked to save his electronic medical history on a flash drive. Is it possible to fulfill such a request at the clinic reception?

Answer: No. The registry does not store electronic medical records.

Problem 98.The patient, on the direction of a neurologist, underwent video electroencephalographic monitoring for 3 hours after a 24-hour lack of sleep. A digital synchronous recording of the bioelectrical activity of the brain (electroencephalography) and a video image of the patient was obtained, and an expert opinion was given. What type of information technology was used?

Answer: medical instrument-computer system for functional diagnostics.

Problem 99.When the rhythmic activity of the heart was disturbed, the patient was implanted with an electrical pacemaker, consisting of a pulse generator, electronic wires and electrodes. What type of simulation in medicine is cardiac pacing?

Answer:This is an energetic (functional) medical model.

Problem 100.A patient with a disturbance in the rhythmic activity of the heart underwent daily ECG monitoring and received an expert opinion on the number of extraordinary contractions of the heart. What type of information technology is used?

Answer: monitoring medical instrument-computer system.

CRITERIA for assessing competencies and rating scales

Grade "unsatisfactory"(not accepted) or absence competence development	Grade "satisfactorily"(passed) or satisfactory (threshold) level of competence development	Rating “good” (passed) or sufficient level mastering competence	“Excellent” grade (passed) or highlevel of competence development
Inability of the learner to learn independently demonstrate knowledge when solving tasks, lack of independence in applying skills. Absence confirmation of the availability of competence indicates negative results in mastering the academic discipline	The student demonstrates independence in applying knowledge, skills and abilities to solve educational tasks in full in accordance with the sample given by the teacher, for tasks whose solutions were shown by the teacher, it should be considered that the competence formed on satisfactory	The student demonstrates independent application of knowledge, skills and abilities when solving tasks, tasks similar to the samples, which confirms the presence formed competence at a higher level. Availability such competence is sufficient level	The student demonstrates the ability to fully independence in choosing a way to solve non-standard assignments within the discipline using knowledge, skills and abilities, received both during the development this discipline and related disciplines should

	level.	indicates sustainable fixed practical skill	consider competence formed at a high level.
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Criteria for assessing test control:

percentage of correct answers	Marks
91-100	Great
81-90	Fine
70-80	satisfactorily
Less than 70	unsatisfactory

When grading tasks with multiple correct answers, one error is allowed.

Interview assessment criteria:

Mark	Descriptors		
	strength of knowledge	ability to explain (present) the essence of phenomena, processes, draw conclusions	logic and consistency answer
Great	strength of knowledge, knowledge of the basic processes of the subject area being studied, the answer is distinguished by the depth and completeness of the topic; knowledge of terminological apparatus; logic and consistency answer	high ability to explain the essence, phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples	high logic and consistency of the answer
Fine	strong knowledge of the basic processes of the subject area being studied, distinguished by the depth and completeness of the topic; possession terminological apparatus; fluency in monologue speech, but one or two inaccuracies are allowed answer	the ability to explain the essence of phenomena, processes, events, draw conclusions and generalizations, give reasoned answers, give examples; however one or two inaccuracies in the answer are allowed	logic and consistency of the answer
satisfactory	satisfactory knowledge of the processes of the subject being studied areas, answer,	satisfactory ability to give reasoned answers and provide	satisfactory logic and consistency answer

	characterized by insufficient depth and completeness of the topic; knowledge of the basic issues of theory. There may be some errors in the content. answer	examples; satisfactorily developed skills in analyzing phenomena and processes. There may be some errors in the content. answer	
unsatisfactory	poor knowledge of the subject area being studied, shallow coverage of the topic; poor knowledge of basic theoretical issues, poor skills in analyzing phenomena and processes. There are serious errors in the content answer	inability to give reasoned answers	lack of logic and consistency in the answer

Criteria for assessing situational tasks:

Mark	Descriptors			
	understand ing the problem	analysis of the situation	situation solving skills	professional thinking
Great	full understanding of the problem. All requirements presented for the task, completed	high ability analyze the situation, draw conclusions	high ability to choose a method to solve a problem, confident situation solving skills	high level of professional thinking
Fine	full understanding of the problem. All requirements presented for the task, completed	ability analyze the situation, draw conclusions	ability to choose a method to solve a problem confident situation solving skills	sufficient level of professional thinking. One or two inaccuracies in the answer are allowed
satisfactory	partial understanding of the problem. Most of the job requirements completed	satisfactory ability to analyze situation, draw conclusions	satisfactory skills solutions to the situation, difficulties with choosing a method for solving a problem	sufficient level of professional thinking. More than two inaccuracies are allowed in answer or error in solution sequences

unsatisfactory	misunderstanding of the problem. Many requirements required for the task, not	low ability analyze the situation	insufficient situation-solving skills	absent
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	completed. No answer. There was no attempt to solve task			
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