

**Questions to offset  
on the subject "Digital technology in medicine"  
for students of the 2nd course of medical faculty**

1. Writing concept and history of digital health
2. What are the structure, subjects and objects of digital health
3. What are the needs of self-preservation behavior of the population and the possibilities of digital health
4. List digital health issues (patient, professional, institutional)
5. To characterize the prospects of digital health care in the self-preservation behavior of the population.
6. Classification of medical images.
7. How the size of the image matrix and its quality are related.
8. What are the ways of processing medical images on a computer.
9. Evidence-based organization and management of the health service.
10. What is a CAD Computer Assistant System?
11. What is virtual reality.
12. Describe the types of virtual reality.
13. Analyze the pros and cons of virtual reality.
14. What are the prospects for virtual reality.
15. Why Mark Zuckerberg invests in VR, why create social networks with augmented reality.
16. Describe the need for artificial intelligence in healthcare.
17. Analyze the process of introducing AI in our country.
18. To characterize the algorithm for modeling the perceptron in the Matlab environment.
19. What is the need for transformation in health care.
20. Digital transformation in healthcare - what is it.
21. Healthcare transformation and value-based treatment comment
22. What is spectral analysis.
23. The role of information technology in biomedical research.
24. Give mathematical definitions of spectral functions and transformations
25. List the functions of the MATLAB package that generate spectral functions and transformations of initial medical signals.
26. What are the principles of obtaining projections of a tomographic image?
27. How is the reconstruction of the head phantom based on projection data.
28. What are the features of the synthesis of projections when using parallel rays?
29. What are the features of the synthesis of projections when using fan rays?
30. List the known biomedical signals.
31. List the main informational characteristics of the ECG signal.
32. Explain why the R wave of the electrocardiogram is used to form HRV time series.
33. How the HRV signal is formed from the electrocardiogram recording.
34. What is the essence of the used algorithm for clearing signals from artifacts.
35. What type of interpolation is recommended for HRV signals.
36. Under what conditions the mathematical expectation and the mode are slightly different.
37. What types of HRV distribution histograms are known.
38. The concept of digital signal processing systems
39. The language of mathematical functions MATLAB and SIMULINK

40. Description of the MATLAB interface
41. Working with matrices in MATLAB
42. Working with graphics in MATLAB
43. Matrices and Arrays in MATLAB
44. Flow control in MATLAB
45. Scripts and Functions in MATLAB
46. Controlled graphics in MATLAB
47. Biomedical signals used in medical diagnostics - classification
48. Block diagram of heart rate variability
49. Physiological nature of the ECG signal
50. Mathematical methods for the analysis of biomedical signals
51. Program for conducting research and importing results into MATLAB
52. Source signal interpolation - methods in MATLAB
53. Fundamentals of spectral analysis in the HAARA bases
54. Definition of wavelet transforms, methods of using them in medical research
55. Windowed Fourier transforms, a technique for using them in medical research
56. Methods of object recognition in medical images using MATLAB
57. What is the result of the direct Fourier transform.
58. Three main spectral components of short records of HRV signals.
59. What parameters are included in the equation of continuous wavelet analysis.
60. How is the scaling parameter of the wavelet transform and the investigated frequency related?
61. List the known basic functions of the wavelet transform.
62. What shape does the scatterogram of the HRV signal usually have?
63. How correlation rhythmography is formed.
64. Estimates of what methods are used to obtain a complex indicator of PARS.
65. List the contents of the original files of HRV signals.
66. What methods are used for interpolation of initial signals to obtain estimates.
67. How many electrodes are used to register HRV signals.
68. Name the file format of MATLAB environment functions.
69. What command in MATLAB environment is used to implement fast Fourier transform. List the main arguments for this command.
70. Describe an algorithm for constructing an attractor in the phase space.
71. What does the multifractal spectrum of a monofractal signal look like?