

# ASSESSMENT MATERIALS FOR INTERMEDIATE CERTIFICATION DISCIPLINE

Документ подписан простой электронной подписью  
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## BIOMEDICAL TECHNOLOGY

Code, direction	05.31.01
preparation	Medicinal case
Focus( profile )	Medicinal case
Form training	full-time
Department-developer	Patophysiology And general pathology
Issuer department	Hospital therapy

## TYPICAL TASKS FOR CONTROL WORKS

(10 SEMESTER)

### List abstract messages:

1. Conceptual space and topological structures of biomedicine.
2. Biomedicine 2040 – horizons of science through the eyes of scientists.
3. drug biodelivery systems.
4. Liposomal drug delivery.
5. Development of genomic technologies: from PCR to SMS (monomolecular sequencing).
6. Genome editing systems (CRISPR, TALEN).
7. Cell therapy for diseases of the cardiovascular system.
8. Cell transplantology.
9. Aspects of women's reproductive health.
10. Biomarkers of cardiovascular diseases.
11. Biomaterials are an important area of biomedical technology.
12. Preparation of polymer biomaterials using radiation-chemical methods.
13. IT in medicine: how technology is changing one of the oldest industries.
14. personnel for IT development in the healthcare system.
15. Therapeutic cloning. Modern approaches to obtaining patient-specific embryonic stem cell lines.
16. Use of cloning in medicine.
17. Biobanking as a branch of biotechnology.
18. *Biobanking: social and humanitarian aspects.*
19. Brain-computer interface technologies and neurofeedback: current state, problems and opportunities for clinical application.
20. History of neural interfaces.
21. Legal regulation of biomedical research involving human subjects.
22. Ethics of Biomedical Research and Experimentation.
23. Philosophical and ethical aspects of biomedicine.
24. Ethical aspects of transplantology, artificial insemination.
25. Iatrogenesis and biomedical technologies.
26. Ethical aspects of artificial insemination and abortion.
27. Biomedical technologies in prenatal diagnosis and preconception preparation.
28. Global challenges affecting the development of biomedical technologies in Russia.
29. Main trends in the development of biomedical research in cardiology and angiology.
30. Bioinformation technologies in practical medicine.
31. Medical robotics (using the example of the minimally invasive surgical complex DaVinci).
32. Neuroprosthetics to restore motor function.
33. Creation of a brain-computer interface - new human capabilities (DARPA projects).

34. Symbiosis of artificial intelligence and neural networks in decoding fMRI data.
35. Minimally invasive cardiovascular technologies.
36. Design of a bioactive scaffold in tissue engineering (using the example of artificial articular cartilage).
37. Evolution of the artificial heart (using the example of the left ventricular assist device HeartMate).
38. Cochlear implants in the treatment of hearing loss.

## **TYPICAL QUESTIONS TO CREDIT (10 semester)**

### **Theoretical issues**

1. Subject of study biomedicine
2. Prerequisites for the emergence of biomedical technologies.
3. Name the main stages of the formation and development of biomedicine
4. Challenges of biomedical technologies
5. The biomedical technology sector as a driver for the development of medicine
6. The evolution of biomedical technologies in the 20th century.
7. Trends in biomedical technologies in the 21st century.
8. Major achievements of biomedicine.
9. The connection between biomedicine and personalized medicine.
10. The connection between biomedicine and translational medicine.
11. The principle of digital PCR and its use.
12. Classical Sanger sequencing
13. Sequencing : Generation 2G
14. Nanopore sequencing
15. Application of sequencing technologies in practical medicine
16. Mass tandem spectrometry
17. Proteomic research in clinical medicine.
18. Liposomal drug delivery.
19. pharmacogenomics .
20. Progress in targeted therapy for hereditary diseases and cancer.
21. Laboratory-on-a-chip in diagnostics and modeling of human diseases.
22. Progress in gene therapy
23. Viral vectors in gene therapy
24. The role of the microbiome in shaping human health and disease
25. Cell therapy and stem cells in the Russian Federation and abroad
26. Genome editing systems (CRISPR, TALEN).
27. Development of sequencing technologies.
28. Examples of successes and failures in biomedical technologies (the rise and fall of Theranos )
29. Biomedical technologies in medicine “5P”
30. Biobanking framework .
31. Modern biobanking technologies .
32. Ethical aspects of transplantology, artificial insemination.
33. Ethical aspects of artificial insemination and artificial termination of pregnancy.
34. Legislative framework for regulating cell products in Russia and abroad