

EXAMINATION QUESTIONS
ON MICROBIOLOGY, VIROLOGY, IMMUNOLOGY
for 3rd year students
(speciality Pharmacy, Medical Faculty of International Students)
5th semester, 2025-2026 academic year

1. Microbiology: definition, branches of science. Tasks and research methods of medical microbiology. The importance of microbiology in the professional activities of a pharmacist.
2. The main stages in the development of microbiology. Scientific researches of Louis Pasteur, Robert Koch and Ilya Mechnikov. Evolution of microorganisms and infectious diseases.
3. The world of microorganisms. Common with other organisms and the unique features of microorganisms. The differences between prokaryotes and eukaryotes. The main shapes of bacteria and examples of their arrangement.
4. Structure of a bacterial cell. Cytoplasmic structures of a bacterial cell (cytoplasm, cytoplasmic membrane, mesosomes, nucleoid, ribosomes, volutin granules): structure, functions, detection methods.
5. Surface structures of a bacterial cell (cell wall, capsule, flagella, pili): structure, functions, detection methods. The mechanism of Gram staining. Bacteria with defective cell walls, their clinical significance.
6. Features of metabolism in prokaryotes. Nutrition of microorganisms. Nutritional types. Sources of macro- and micronutrients, growth factors. The mechanisms of nutrients delivery into the bacterial cell.
7. Respiration of microorganisms, its types. Enzymes and microbial cell structures involved in the respiration process. Classification of bacteria according to their oxygen requirement.
8. Growth and reproduction of bacteria. Mechanism and phases of bacterial division. Resting forms of microorganisms: causes of formation, significance.
9. Specimens for microbiological diagnostics: types, rules of collection, storage, transport to the laboratory. Principles of microbiological laboratory organization, equipment and operating modes. Standard precautions. Biosafety levels.
10. Microscopic (bacterioscopic) diagnostic method: definition, goals, stages, advantages and disadvantages. Types of microscopic preparations. Staining techniques. Principles of microscopy. Methods of studying microorganisms in a living state.
11. Cultural (bacteriological, 5 I's) diagnostic method: definition, goals, stages, advantages and disadvantages. Identification of microorganisms: morphological, cultural, biochemical, serological, biological, genetic. Automated systems for bacterial identification.
12. Culture media: requirements, classifications (by origin, constituents, consistency, purpose of use), preparation. Factors affecting growth of bacteria. Bacterial growth in liquid and solid nutrient media. Periodic and continuous cultivation.
13. Methods for isolation and identification of pure cultures of aerobic and anaerobic bacteria. Features of cultivation of anaerobic bacteria. Methods of direct identification of microorganisms, without pure culture isolation (antigen detection, molecular diagnosis).
14. Characteristics and biological role of bacterial genetic apparatus. Bacterial chromosome, extrachromosomal (plasmid) and mobile (transposons, IS elements) genetic elements. Types of plasmids.
15. Heredity and variability of microorganisms. Types of bacterial variability: phenotypic and genetic. The practical significance of microorganism variability in diagnostics, therapy and prevention of infectious diseases.
16. Mechanisms of genetic variability of microorganisms: mutations and genetic recombinations.
17. Principles of molecular genetic analysis. Application of molecular genetic methods in microbiology. Concept of genetic engineering and biotechnology. Genomics and proteomics. Genetic mapping of microbial DNA.

18. Molecular typing of microorganisms (ribotyping). Molecular genetic methods based on the study of DNA fragments (plasmid typing, restriction endonuclease analysis). Molecular genetic methods based on nucleic acid hybridization (molecular hybridization).
19. Molecular methods based on nucleic acid amplification in diagnosis of infection diseases. PCR: definition, goals, stages, advantages and disadvantages. Sequencing of microbial genomes.
20. Ecology of microorganisms: definition, tasks, basic concepts of ecology. Types of ecological interactions of microorganisms. The role of microorganisms in the creation and development of the biosphere (the concept of microbial dominance).
21. Microbiome of the skin, oral cavity, respiratory tract, gastrointestinal tract, genitourinary system, its characteristics. Beneficial effects and methods of studying of indigenous (resident) microflora. Dysbiosis: causes, consequences, prevention, principles of correction. Probiotics and prebiotics.
22. The microflora of air, water, soil. Sanitary indicator microorganisms.
23. The concept of epiphytic and phytopathogenic microorganisms. Infectious diseases of plants caused by phytopathogenic microorganisms, their manifestations.
24. Microflora of air, water, soil. Sanitary indicator microorganisms.
25. The concept of epiphytic and phytopathogenic microorganisms. The role of microorganisms in the development of plant diseases. Microbiological assessment of herbal medicinal raw materials.
26. Microflora of medicinal raw materials and finished dosage forms. Sources and causes of microbial contamination. Signs of microbial spoilage of dosage forms and measures to prevent it.
27. Methods for assessing the microbiological purity and sterility of medicines. Pyrogens. Determination of endotoxins using the LAL test. Microbiological control of water for injection.
28. Sanitary and epidemiological requirements for pharmacies. Sanitary and hygienic regime of pharmacy facilities.
29. Effects of physical and chemical agents on microorganisms. Antimicrobial measures (direct and indirect). The concept of antimicrobial regime. Asepsis.
30. Antisepsis: definition of the concept, types, antisepsis methods. Antiseptics: classification, modes of action, adverse effects of antiseptic use.
31. Sterilization: definition of the concept, sterilization methods (physical, chemical, mechanical), sterilization quality control. Consequences of insufficient sterilization.
32. Disinfection: definition of the concept, goals, types, disinfection methods, disinfection quality control. Disinfectants: classification, modes of action.
33. The doctrine of infectious process: definition, causes and conditions of occurrence. Differences between communicable and non-communicable diseases. Infectious disease periods. Outcomes of infectious disease.
34. The role of microorganisms in the infectious process. Routes of infection transmission. Infective dose of the bacteria. Pathogenicity and virulence. Opportunistic pathogens. E.S.K.A.P.E. pathogens.
35. Mechanism of bacterial pathogenesis (adhesion, invasion, intracellular survival, toxins). Differences between bacterial endotoxins and exotoxins. Bacterial exotoxins and their mechanism of action.
36. The role host factors (age, heredity, immune status, lifestyle), environmental factors (seasonality, disinfectants, presence of vectors) and social factors in the infectious process. Nosocomial infections. Bioterrorism.
37. Concept of the source of infection. Anthroponoses, zoonoses, sapronoses, and their examples. Classification of infectious diseases according to types of pathogens, clinical manifestations, severity, duration, degree of contagiousness, recurrence of the pathogen, number of pathogens, spread in the body and in the world. Sepsis.
38. Biological method (application of laboratory animals in microbiology): goals, stages, examples, advantages and disadvantages.
39. Chemoprophylaxis and chemotherapy of infectious diseases. Requirements for antimicrobial medicines. Groups of antimicrobial medicines, properties.
40. Antibiotics: characteristics, classification, mechanisms of action on microbial cells.
41. Principles of rational antimicrobial chemotherapy. Antibiotic adverse effects.

42. Antimicrobial (intrinsic and acquired) resistance, significance. Genetic and biochemical mechanisms of antimicrobial resistance. Categories of resistance: MDR (Multi-Drug Resistance), XDR (Extensive Drug Resistance), PDR (Pan Drug Resistance).
43. Classification of antimicrobial susceptibility test methods. Principles of antimicrobial susceptibility testing, phenotypic and genotypic methods. Empirical antibiotic therapy. Antibiotic prophylaxis: when and where?
44. Immunology: definition, objectives, methods, history of development, directions.
45. The immune system: organs, cells, molecules. Central (primary) and peripheral (secondary) organs of the immune system. Immunocompetent cells (natural killer cells, dendritic cells), functions.
46. Molecules of the I and II classes of major histocompatibility complex: structure and functions. CD-nomenclature of cell surface molecules.
47. Cytokines (interleukins, interferons, tumor necrosis factors, colony stimulating factors), their functions.
48. Immunity: definition, types of immunity (innate and acquired, active and passive). Mechanisms of innate immunity. Maternal immunity: mechanisms, significance.
49. The complement system: definition, main components and factors characteristics, activators and activation pathways, functions of components and their fragments.
50. Phagocytes, classification. Recognition of microorganisms. Phagocytic reaction: stages, mechanisms of intracellular microorganisms killing, outcomes. Antigen presenting cells.
51. Immune response: definition, conditions of development. Antigens: structure, properties, classification, T-dependent and T-independent antigens. Superantigens.
52. Antigens of microorganisms. Antigenic structure of bacteria. Type, species, group antigens. Protective antigens. Cross-reacting antigens, significance.
53. B-lymphocytes: development, markers, antigen-specific B-cell receptor. Methods for assaying B-lymphocytes and their functional activity.
54. Humoral immune response: definition, stages, manifestation. T-dependent and T-independent humoral immune response. Primary and secondary humoral immune response, characteristics.
55. Antibodies (immunoglobulins): structure, classes, functions. The mechanism of antibodies and antigens interaction. Affinity and avidity.
56. T-lymphocytes: development, markers, subpopulations. T-cell receptor. Methods for assaying T-lymphocytes and their functional activity.
57. Cellular immune response: definition, stages, manifestations. Activation of T-lymphocytes. The model of three signals. Immunological memory.
58. Serological diagnostic method: definition, goals, basic concepts (diagnosticum, diagnostic serum, titer, diagnostic titer, paired sera), advantages and disadvantages. Biological samples for serological diagnostics. Basic principles of serological tests. Application of serological method for detection non-infectious markers.
59. Agglutination test: ingredients, mechanism, design options (slide and tube), registration of results, practical application.
60. Passive (indirect) hemagglutination test: ingredients, mechanism, design options (hemagglutination and latex), registration results, practical application. Coagglutination test.
61. Immunoprecipitation test: ingredients, mechanism, design options (ring and gel), registration results, practical application. Immune lysis tests.
62. Solid phase immunoassays and their practical application. Immunofluorescence assay. Radioimmunoassay. Immune electron microscopy. Immunochromatography.
63. ELISA: mechanisms, design options (indirect, sandwich), registration results, practical application. 3rd and 4th generation ELISA test-systems. Immunoblotting, practical application.
64. Immunoprophylaxis and immunotherapy of infectious diseases: definitions, achievements and challenges. Active immunoprophylaxis. Vaccines: requirements, the concept of "ideal vaccine".

- Adjuvants, their action mechanisms. Collective immunity to infectious diseases, significance. Immune stratum, causes and consequences of its decrease. Booster immunization.
65. Vaccines: live, inactivated (corpuscular, chemical, conjugated, split, subunit), toxoids, recombinant, m-RNA. Associated vaccines, their advantages and examples. Adverse effects of vaccination: severe post-vaccination reaction, post-vaccination complications.
 66. Passive immunoprophylaxis and immunotherapy of infectious diseases: indications, principles, complications. Classification of serum and immunoglobulin preparations (according to specificity, production method, object of antibodies action, purpose). Monoclonal antibodies: principles of production, application.
 67. Allergology: definition, goals. Allergens: structure, examples, cross-reactive allergens. Allergy reaction: stages, types.
 68. Immediate type of hypersensitivity (ITH), classification. Type I hypersensitivity reaction (mediator): allergens, mechanism, stages, manifestation options. Anaphylaxis (active and passive), methods of diagnosis and prevention. Clinical manifestations of atopic diseases.
 69. Type II hypersensitivity reaction (cytotoxic): allergens, mechanism, manifestations, diagnostic methods. Type III hypersensitivity reaction (immune complex): allergens, mechanism, manifestations, diagnostic methods.
 70. Delayed (IV) type of hypersensitivity (DTH): allergens, mechanism, diagnostic methods. Infectious and contact allergy.
 71. Drug allergy: main allergens, mechanisms and types of allergic reactions, methods of diagnosis and prevention. Food allergy: allergens, mechanisms and manifestations. Idiosyncrasy.
 72. Clinical immunology: definition, goals. Immune status: principles and methods of assessment. Immunogram.
 73. Immunodeficiency disorders: definition, classification, causes, diagnostic methods, principles of correction.
 74. Autoimmune diseases: definition, causes, mechanisms of tissue damage, classification, manifestations and examples, principles of treatment, prevention.
 75. The concept of immunocorrection, indications for its implementation. Immunomodulators (natural and synthetic). Immunosuppressants.
 76. *Staphylococci*: taxonomy, characteristic, virulence factors. Staphylococcal infections: pathogenesis, immunity, microbiological diagnosis, principles of etiotropic therapy, immunotherapy, prevention. Antibiotic resistance: β -lactamase, MRSA. Staphylococcal carriage, significance.
 77. *Streptococci*: taxonomy, characteristic, hemolytic groups, virulence factors. Streptococcal diseases: pathogenesis, immunity, microbiological diagnosis, therapy, prevention. *Pneumococci*, role in pathology. Prevention of pneumococcal infections.
 78. *Haemophilus influenzae*: taxonomy, characteristics, virulence factors. Hib-infections: pathogenesis, immunity, microbiological diagnosis, prevention.
 79. *Neisseria meningitidis*: taxonomy, characteristic, virulence factors. Meningococcal infections: pathogenesis, immunity, microbiological diagnosis, therapy, prevention.
 80. *Neisseria gonorrhoeae*: taxonomy, characteristics, virulence factors. Pathogenesis, immunity, microbiological diagnosis, etiotropic therapy of acute and chronic gonorrhea. Prevention of gonorrhea and gonococcal conjunctivitis.
 81. General characteristics of gastrointestinal infections. *Enterobacteria* family: taxonomy, characteristics, virulence factors. Principles of microbiological diagnosis of enterobacterial gastrointestinal infections. Culture media for Enterobacteria. Principles of enterobacteria identification.
 78. *Escherichia*: taxonomy, characteristics, virulence factors. Opportunistic *Escherichia coli*, biological role. Groups of pathogenic *E. coli*. Escherichiosis: pathogenesis, immunity, microbiological diagnosis, prevention. *E. coli* as a causative agent of urinary tract infections.
 82. *Salmonella*: taxonomy, characteristics, antigen structure (Kauffmann-White classification), virulence factors, role in pathology. Salmonellosis: etiology, pathogenesis, immunity,

- microbiological diagnosis, prevention.
83. *Typhoid and paratyphoid fever pathogens*: taxonomy, characteristics, virulence factors. Typhoid fever and paratyphoid fever: pathogenesis, immunity, microbiological diagnosis, therapy, prevention. *S. typhi* carriage, significance.
 84. *Shigella*: taxonomy, characteristics, antigen structure, virulence factors. Shigellosis (bacterial dysentery): pathogenesis, immunity, microbiological diagnosis, prevention.
 85. *Klebsiella*: taxonomy, characteristics, virulence factors, role in human pathology, antibiotic resistance. Microbiological diagnosis of klebsiellosis.
 86. *Yersinia enterocolitica*: taxonomy, characteristics, virulence factors. Yersiniosis: pathogenesis, immunity, microbiological diagnosis, prevention.
 87. *Mycobacteria*: taxonomy, characteristics, virulence factors. Tuberculosis: pathogenesis, immunity, features of culture, molecular genetic and allergological diagnosis, prevention. Tuberculosis treatment, mycobacteria with multi- and extensive drug resistance.
 88. *Corynebacterium diphtheriae*: taxonomy, characteristics, virulence factors. Diphtheria exotoxin, mechanism of action, target cells. Diphtheria: pathogenesis, immunity, microbiological diagnosis, immunotherapy, prevention. Control of post-vaccination immunity. Carriage of non-toxigenic *C. diphtheriae*, significance.
 89. *Bordetella*: taxonomy, characteristics, antigen structure, virulence factors. Whooping cough (pertussis, 100 day cough): pathogenesis, immunity, microbiological diagnosis, features of sampling, etiotropic therapy, prevention.
 90. *Ecological group of obligate anaerobic bacteria*: classification, characteristics, role in pathology. Character traits of anaerobic infections. *Clostridium difficile* as a nosocomial pathogen. Clostridial gastroenteritis and colitis. Antimicrobials active against *C. difficile*.
 91. *Clostridium tetani*: taxonomy, characteristics, virulence factors. Tetanus: pathogenesis, immunity, microbiological diagnosis, prevention, immunotherapy. Neonatal tetanus.
 92. *Gas gangrene Clostridia*: taxonomy, characteristics, virulence factors. Clostridial myonecrosis: pathogenesis, immunity, microbiological diagnosis, prevention, immunotherapy.
 93. *Clostridia botulinum*: taxonomy, characteristics, virulence factors. Botulinum toxin: properties, mechanism of action Botulism: pathogenesis, immunity, microbiological diagnosis, prevention, immunotherapy.
 94. *Campylobacter*: taxonomy, characteristics, role in pathology. *Helicobacter*: taxonomy, characteristics, virulence factors. Helicobacteriosis: pathogenesis, immunity, microbiological diagnosis, etiotropic therapy, prevention.
 95. Non-fermenting gram-negative bacteria. *Pseudomonas*: taxonomy, characteristics, virulence factors, role in pathology, antimicrobial resistance.
 96. *Vibrio cholerae*: taxonomy, characteristics, antigen structure, virulence factors. Cholera: pathogenesis, immunity, microbiological diagnosis, principles of therapy, prevention.
 97. *Yersinia pestis*: taxonomy, characteristics, virulence factors. Plague: pathogenesis, immunity, microbiological diagnosis, therapy, prevention.
 98. *Francisella tularensis*: taxonomy, characteristics, virulence factors. Tularemia: pathogenesis, immunity, microbiological diagnosis, therapy, prevention.
 99. *Brucella*: taxonomy, characteristics, virulence factors. Brucellosis: pathogenesis, immunity, microbiological diagnosis, therapy, prevention.
 100. *Bacilli*: taxonomy, characteristics, virulence factors. Anthrax: pathogenesis, immunity, microbiological diagnosis, therapy, prevention.
 101. *Spirochetes*: taxonomy, classification. *Leptospira*: characteristics, virulence factors. Leptospirosis: pathogenesis, immunity, microbiological diagnosis, prevention.
 102. *Treponema*: taxonomy, characteristics, role in pathology. *T. pallidum*: characteristics, virulence factors. Syphilis: pathogenesis, immunity, microbiological diagnosis, therapy, prevention. Congenital syphilis.

103. *Borrelia*: taxonomy, characteristics, antigen structure, virulence factors, role in pathology. Lyme disease: etiology, pathogenesis, immunity, microbiological diagnosis, therapy, prevention.
104. *Rickettsia*: taxonomy, characteristics, antigen structure, virulence factors. Epidemic typhus and relapsing: etiology, pathogenesis, immunity, microbiological diagnosis, prevention. Murine typhus: etiology, pathogenesis, prevention.
105. *Chlamydia*: taxonomy, characteristics, chlamydia life cycle, virulence factors. Diseases caused by Chlamydia: pathogenesis, microbiological diagnosis, etiologic therapy, prevention.
106. *Mycoplasma*: taxonomy, characteristics, virulence factors. Mycoplasma infections: pathogenesis, immunity, microbiological diagnosis, etiologic therapy, prevention.
107. Virology: definition, goals, methods. Taxonomy and classification of viruses. Scientific research of Dmitry Ivanovsky.
108. Forms of existence of viruses. Morphology and biochemical structure of virions. Viral genome organization, Baltimore's classification of viruses. Structure, properties and functions of nucleic acids, proteins, lipids and carbohydrates of virions.
109. Interaction of the virus and susceptible cell. Strict cytotropism of viruses, cell receptors for viruses, examples. Strict parasitism of viruses. Reproduction strategy of DNA and RNA viruses.
110. Bacterial viruses (phages): properties, classification. Interaction of virulent and temperate phages with susceptible bacteria. Temperate phages. Lysogeny. Practical use of bacteriophages: phage typing, phage prophylaxis, phage therapy.
111. Types of viral infection of cells. Changes in host cells in the process of a viral infection. Features of viral infection of an organism. Acute, chronic and slow infections.
112. Local and systemic mechanisms of innate and acquired antiviral immunity. Interferons: classes, properties, mechanisms of antiviral activity.
113. Principles of etiological diagnosis of viral infections. Rapid methods. Serological diagnosis of viral infections. Hemagglutination/hemadsorption inhibition test: mechanisms, registration results, practical application. Neutralization test: mechanisms, registration results, practical application.
114. Cultivation of viruses. Cell cultures: types, infection methods. Indication and identification of viruses in cell culture. Types of cytopathic effects. Viral inclusions: nature, localization, diagnostic value.
115. Cultivation of viruses in a chicken embryo: infection methods, indication and identification of viruses. Cultivation of viruses on laboratory animals: infection methods, indication and identification of viruses.
116. Principles of chemotherapy of viral infections. Groups of antiviral medicines and their mechanisms of action. Viral load, tests for determining it.
117. The etiology of acute respiratory viral infections. *Rhinoviruses*: classification, characteristics, role in human pathology.
118. *Influenza viruses*: classification, characteristics. Influenza A virus: genome, properties and functions of virion proteins, the antigen structure and its variability. Influenza: pathogenesis, immunity, etiological diagnosis, prevention. Chemotherapy and chemoprophylaxis of influenza. Bird and swine flu viruses.
119. *Paramyxoviruses*: classification, characteristics, role in pathology. *Parainfluenza viruses*: cytotropism, serotypes, pathogenesis, immunity, diagnostics. *Mumps*: cytotropism, pathogenesis, etiological diagnosis, prevention. *RSV infection*: pathogenetic features of the disease, immunity.
120. *Measles virus*: classification, characteristics. Measles: pathogenesis, immunity, diagnosis, prevention. Causes of the measles outbreak in the world. Mitigated measles. Subacute sclerosing panencephalitis.
121. *Coronaviruses*: classification, characteristics. SARS-CoV coronavirus, severe acute respiratory syndrome (SARS). MERS-CoV coronavirus, Middle East respiratory syndrome (MERS). SARS-CoV-2 coronavirus and infection COVID-19: pathogenesis, immunity, etiological diagnosis, prevention, antiviral therapy.
122. *Rubiviruses*: classification, characteristics. Rubella: pathogenesis, etiological diagnosis, prevention. Congenital rubella syndrome.

123. *Adenoviruses*: classification, characteristics. Adenoviral infections: pathogenesis, immunity, etiological diagnosis. Parvoviruses: classification, characteristics, role in human pathology.
124. *Rabies virus*: classification, characteristics, cytotropism, specific inclusions. Rabies: pathogenesis, etiological diagnosis, prevention.
125. Viruses as etiological agents of gastrointestinal infections. *Picornaviruses*: classification, characteristics, role in pathology. Non-polio enteroviruses and enteroviral infections: multiorgan cytotropism, pathogenesis, prevention.
126. *Polio virus*: classification, characteristics. Poliomyelitis: pathogenesis, immunity, etiological diagnosis, prevention. Vaccine-associated poliomyelitis.
127. *Rotaviruses*: classification, characteristics. Rotavirus infections: pathogenesis, etiological diagnosis, prevention. Noroviruses: classification, characteristics, role in human pathology.
128. *Enteric hepatitis viruses*: classification, characteristics. *Viral hepatitis A*: pathogenesis, immunity, etiological diagnosis, prevention. *Viral hepatitis E*: pathogenesis, features of infection in pregnant women, immunity, etiological diagnosis, prevention.
129. *Parenteral hepatitis viruses*. *Hepatitis virus B*: classification, characteristics, antigens. Viral hepatitis B: pathogenesis, immunity, etiological diagnosis, laboratory markers of carriage and acute infection, etiologic therapy, prevention. *Hepatitis virus D*, role in pathology.
130. *Hepatitis virus C*: classification, characteristics, antigens. Viral hepatitis C: pathogenesis, immunity, etiological diagnosis, laboratory markers of acute infection, etiologic therapy, prevention.
131. *Retroviruses*. Human immunodeficiency viruses (HIV-1, HIV-2): virions morphology, genome, antigenic structure. HIV reproduction. HIV infection: pathogenesis, immunity, etiological diagnosis. Principles of HAART – highly active antiretroviral therapy. Prevention of HIV infection and AIDS-associated diseases. Prevention of occupational HIV infection in healthcare workers.
132. *Herpesviruses*: classification, characteristics, reproduction. Diseases caused by herpes simplex viruses: pathogenesis, immunity, etiological diagnosis, etiologic therapy, immunotherapy. *Papillomaviruses*, role in pathology. Prevention of papillomavirus infection.
133. *Chickenpox (varicella) and shingles (herpes zoster)*: etiology, pathogenesis, prevention, etiological diagnosis, etiologic therapy. The role of herpes viruses types 4-8 in pathology.
134. *Arbovirus infections*: pathogenesis, clinical features. *Tick-borne encephalitis*: etiology, pathogenesis, etiological diagnosis, prevention. Other arbovirus infections (Dengue fever, yellow fever, Japanese encephalitis, Zika fever).
135. Prions: characteristics, role in human pathology. Prevention of prion diseases.
136. *Pathogenic fungi*: taxonomy, characteristics. Fungal infections: clinical classification, contributing factors and conditions, principles of etiologic diagnosis, features of chemotherapy.

LIST OF PRACTICAL SKILLS

to be taken on the exam day before the theoretical exam

- Students are allowed to take the theoretical exam if they have successfully passed the 1st stage (practical skills passed with a grade of “4” or higher).
 - The grade on Practical skills exam will make up 10% of the Final exam grade.
 - Each student will have to pass 2 skills: morphological identification of a microorganism by immersion microscopy (##4–15) and another skill from the list below.
1. Prepare a fixed smear from a broth culture of bacteria.
 2. Prepare a fixed smear from agar culture of bacteria.
 3. Stain the fixed smear using the Gram method.
 4. Perform oil immersion microscopy of a fixed smear.
 5. Find and morphologically identify staphylococci in a pure culture smear, stained by the Gram method
 6. Find and morphologically identify streptococci in a pure culture smear, stained by the Gram method.
 7. Find and morphologically identify *Escherichia coli* in a pure culture smear, stained by the Gram method.
 8. Find and morphologically identify *Staphylococcus aureus* and *Escherichia coli*, in a mixed culture smear, stained by the Gram method.
 9. Find and morphologically identify *Bacillus anthracis* in a pure culture smear, stained by the Gram method.
 10. Find and morphologically identify *Vibrio cholerae* in a pure culture smear, stained by the Gram method.
 11. Find and morphologically identify encapsulated bacteria (*Klebsiella*) in a pure culture smear, stained by Burri-Gins method (negative staining).
 12. Find and morphologically identify *Neisseria gonorrhoeae* in a smear of pus from urethra, stained by the Gram method.
 13. Find and morphologically identify acid-stable *Mycobacterium tuberculosis* in a smear of sputum, stained by the Ziehl-Nielsen method.
 14. Find and morphologically identify *Corynebacterium diphtheriae* in a pure culture smear, stained by the Loeffler method.
 15. Find and morphologically identify *Candida* in a pure culture smear, stained by the Gram method.
 16. Evaluate the results of microbial culture susceptibility/resistance to antibiotics using disk-diffusion method (Kirby-Bauer Test).
 17. Perform and evaluate of the slide agglutination test to identify enterobacteria.
 18. Evaluate the results of the passive (indirect) hemagglutination test to assess the immunity.
 19. Evaluate the results of the hemagglutination inhibition test for seroidentification of influenza virus.
 20. Evaluate the results of the hemagglutination inhibition test for serodiagnosis of viral infection.

The examination questions were discussed and approved at the meeting of the Department of Microbiology, Virology, Immunology on December 10, 2025, protocol of the meeting N 7.

Head of the Department
of Microbiology, Virology, Immunology,
PhD, Associate Professor



I.A. Gavrilova