

**Examination questions for the discipline "Microbiology, Virology, Immunology"
for second-year students in the specialty "Dentistry"
(2025-2026 academic year)**

1. Microbiology: definition, area and fields of microbiology, the role of microbiology in the dentist's practice. Objects and methods of research.
2. Historical overview of microbiology as a science. Work of L. Pasteur, R. Koch, I. I. Mechnikov. Evolution of microorganisms and infectious diseases.
3. Characteristics of microorganisms. Principles of systematics and nomenclature. The concept of "species" in bacteria. Criteria for species identification.
4. Morphology of bacteria. Basic morphological forms of bacteria. The structure of a bacterial cell. Functions of the surface and cytoplasmic structures of a bacterial cell.
5. The structure of the cell wall of Gram-positive and Gram-negative bacteria. Technique and mechanism of Gram staining. L-forms of bacteria, medical significance.
6. Metabolism in prokaryotes. Nutrition of bacteria: types, requirements of bacteria, nutrients and transport of nutrients into the bacterial cell.
7. Energy production in bacteria: respiration and fermentation (types, pathways of energy production, enzymes and cell structures involved). Classification of bacteria regarding their oxygen requirements.
8. Growth and reproduction of bacteria. The mechanism of simple division and its phases. Dormant (resting) forms of microorganisms: general characteristics, factors inducing their formation, medical importance.
9. Sampling for microbiological studies: types of samples, the rules of sampling, storage, transportation. Principles of organization, equipment and levels of biosafety in microbiological laboratories.
10. Microscopic (bacterioscopic) diagnostic method: definition, aim and tasks, steps and method evaluation. Types of microscopic preparations. Staining methods. Types of microscopes.
11. Cultural (bacteriological) diagnostic method: definition aims and tasks, steps, evaluation of the method (sensitivity, specificity, advantages and disadvantages).
12. Cultivation of bacteria, nutrient media: requirements, classifications. Methods for the isolation of pure cultures of aerobic and anaerobic bacteria.
13. Methods of identification of aerobic and anaerobic bacteria pure cultures. Identification of microorganisms without pure culture isolation.
14. Genetic apparatus of bacteria (nucleoid, plasmids, transposons, IS-elements) characteristics, functions, importance. The concept of genetic engineering and biotechnology.
15. Inheritance and variability of microorganisms. Types of variability. Mutations. The genetic recombination of bacteria. Phenotypic variability. The practical significance of the variability of microorganisms in the diagnosis, treatment, and prevention of infectious diseases.

16. Molecular biological diagnostic method (molecular hybridization, polymerase chain reaction, sequencing, microarray analysis techniques): definition, the principle of the methods, application in dentistry.
17. Infection (infectious process): definition. Differences in communicable and non-communicable diseases. Periods (stages) and outcomes of infectious diseases.
18. Infectious diseases classification by: the nature of the pathogen, the source of infection, the mechanisms and routes of infection transmission, prevalence, occurrence rate of infection, duration.
19. The role of microorganisms in the infectious process. Pathogenicity and virulence. Factors of pathogenicity of microorganisms. Genetic control of pathogenicity. Mechanisms of microbial persistence and latency in host's organisms.
20. Microbial toxins. Types of exotoxins and their biological properties. Bacterial endotoxins.
21. The role of host, social, environmental factors in the infectious process.
22. Biological (experimental) method: definition, aims and tasks, steps, evaluation of the method (sensitivity, specificity, advantages and disadvantages).
23. The ecology of microorganisms. Types of ecological relationships in microorganisms. The role of microorganisms in the genesis and development of the biosphere (the concept of the microbial dominance). Spread of microorganisms in the nature.
24. The characteristic of normal human microflora and its biological role. Methods of study. Dysbiosis: causes, consequences, prevention. Gnotobiology.
25. Asepsis, its meaning. Sterilization: definition, methods, quality control. Sterilization of instruments and medical devices in dental practice. Consequences of sterilization errors and sterilization process controls.
26. Disinfection: definition, types, methods of disinfection. Groups of disinfectants used in dentistry.
27. The antisepsis: definition, types, methods. Antiseptics: classification, mechanisms of action, side effects. Principles of rational antisepsis in dental practice.
28. The chemotherapy and chemoprophylaxis of infectious diseases. Groups of antimicrobial chemotherapeutic agents, mechanisms and spectrum of action on microbial cells. Chemotherapeutic index.
29. Antibiotics: definition, classification. Requirements for antibiotics. Mechanisms of antibiotics action.
30. Principles of a rational (definitive) antibiotic therapy in stomatology. Antibiotics application for the prevention of bacterial complications. Side effects of antibiotics.
31. Natural and acquired resistance of microorganisms to antibiotics. The genetic and biochemical mechanisms of antimicrobial resistance of microorganisms.
32. Genotypic and phenotypic (diffusion methods, serial dilution method) methods for antimicrobial susceptibility testing. Automatic methods for assessing the sensitivity of bacteria to antibiotics.

33. Immunology: definition, area and fields of immunology Objects and methods of research. Historical overview of immunology as a science. Immunity: definition, types of immunity.
34. Immune system: organs, cells, molecules: MHC (structure, expression on cells, biological role), cytokines (classification, functions).
35. Innate immunity. Immune and non-immune factors of innate immunity. Mechanisms of recognition in the innate immune system.
36. Phagocytes, classification. Phagocytosis reaction: phases, mechanisms of intracellular microorganisms killing, outcomes. Methods of phagocytosis evaluation. Phagocytic index, definition and importance in clinical practice.
37. Complement system: definition, main components, activators and activation pathways, functions of components and their fragments. Methods of evaluation of the complement system activity.
38. Antigens: structure, properties, classification. T-dependent and T-independent antigens. Haptens. Superantigens.
39. Antigens of microorganisms. Antigenic structure of bacteria. Type, species, group antigens. Protective antigens. Cross-reactive antigens, medical importance.
40. Antigen presenting cells: types, characteristics. B-lymphocytes: development markers, antigen-specific B-cell receptor.
41. Humoral immune response: definition, development. Activation, proliferation, differentiation, and interaction of cells involved. T-dependent and T-independent response. Antibody isotype switching. Affinity maturation. Primary and secondary humoral immune response characteristics.
42. Antibodies (immunoglobulins): structure, properties, classification. Immunoglobulins biosynthesis. The mechanism of interaction of antibodies with antigens: specificity, phases, manifestations. Affinity and avidity. Monoclonal antibody: principles of production, application.
43. Serological diagnostic method: definition, objectives, basic concepts (diagnosticum, diagnostic serum, antibody titer, diagnostic titer, paired sera). Samples for serological examination. General characteristics of the method. Serological method application for diagnostics of infectious and noninfectious diseases.
44. Agglutination: ingredients, main variants of performance, results evaluation, application. Indirect (passive) and reverse passive agglutination: ingredients, mechanism, results evaluation, application.
45. Immunoprecipitation reaction: ingredients, mechanism, main methods of performance, application. Reaction of the immunolysis.
46. Immunofluorescence (fluorescent antibodies test, FAT), main variants, ingredients, mechanisms, results evaluation, application. Enzyme-linked immunosorbent assay (ELISA): ingredients, mechanisms, results evaluation, application. Immunoblotting (IB). Radioimmunoassay (RIA).

47. T cells: development, positive and negative selection, markers, subpopulations. Helper T-cells, main types (Th1, Th2, Th3, Th17), spectrum of cytokines produced. T-cell receptor: structure, types, genetic control, diversity.
48. Cellular immune response: definition, development, main stages. The model of two (three) signals: the response, anergy, apoptosis. Main phenomena of cellular immune response. Immunological memory.
49. Anti-infective immunity: classification. Mechanisms of antitoxic, antibacterial, antifungal, antiparasite immunity. Antitumor immunity.
50. Immunoprophylaxis and immunotherapy for infectious diseases. Active immunoprophylaxis. Vaccines: requirements, characteristics of main types of vaccines. Adjuvants: definition mechanisms of action.
51. Post-vaccination immunity: mechanisms and factors influencing its development. Immunization schedule. Side effects of vaccination. Post-vaccination complications.
52. Passive immunoprophylaxis and immunotherapy of infectious diseases: indications, principles, complications.
53. Allergology: the definition, objectives. Allergy: the stages, types of reactions. Classification of allergens. Molecular allergens. Allergens in dentistry.
54. Immediate type hypersensitivity (ITH). Mediator type (I) ITH: allergens, mechanism, development, manifestations in the oral cavity. Anaphylaxis. Principles of treatment and prevention.
55. Cytotoxic (II) type ITH: allergens, development, mechanisms, manifestations. Immunocomplex (III) type ITH: allergens, development, mechanisms. Manifestations of allergic reactions II and III types in the oral cavity.
56. Delayed type of hypersensitivity (IV): allergens, development, mechanism, manifestations, importance in oral cavity.
57. Drug allergy: major allergens, the mechanisms and types of allergic reactions, methods for diagnostics and prevention. Food allergy. Main allergens. Prevention of food allergy. Pseudoallergy. Idiosyncrasy.
58. Methods of diagnosing allergic diseases. Principles of treatment. Prevention of allergy.
59. Clinical Immunology: definition, objectives, main concepts. Immune status: principle and methods of evaluation. Methods for determining the amount and functional activity of T and B lymphocytes.
60. Immunological tolerance. Autoimmune diseases: definition, classification, etiology, mechanisms of tissue damage, manifestations in the maxillofacial region and examples of autoimmune diseases.
61. Immunodeficiencies: classification, etiology, methods for diagnostics, principles for correction.
62. Transplantation immunity. Types of transplants. Transplantation antigens. The immunology of transplant rejection, its mechanisms. Methods for suppressing the transplantation reaction. Immunosuppressive drugs and associated complications.

63. Staphylococci: classification, characteristics, pathogenicity factors. Staphylococcal infections: pathogenesis, immunity, principles of microbiological diagnosis and treatment. Methicillin and Vancomycin resistant *Staphylococcus aureus* (MRSA, VRSA). Staphylococcal carriage: significance.
64. Streptococci: classification, characteristics, antigenic structure, pathogenicity factors. Streptococcal diseases and post-streptococcal disorders: pathogenesis, immunity, microbiological diagnosis.
65. Pneumococci: classification, characteristics, antigenic structure, pathogenicity factors. Pneumococcal infections. Microbiological diagnosis. Prevention. Principles of treatment.
66. *Neisseria meningitidis*: systematics, characteristics, antigenic structure, pathogenicity factors. Meningococcal infections: pathogenesis, immunity, principles of microbiological diagnosis, prophylaxis.
67. *Neisseria gonorrhoeae*: systematics, characteristics, pathogenicity factors. Gonococcal infections: pathogenesis, immunity, principles of microbiological diagnostics. Prevention of gonorrhoea and gonococcal conjunctivitis and stomatitis.
68. Enterobacteria family: classification, characteristics, pathogenicity factors. Principle of microbiological diagnosis of enteric infections caused by Enterobacteria. Principles of enterobacteria identification.
69. Escherichia: systematics, characteristics, antigenic structure, pathogenicity factors. Pathogenic and opportunistic Escherichia coli. The biological role of *Escherichia coli*. Escherichiosis: pathogenesis, immunity, microbiological diagnosis and prevention.
70. Salmonella: systematics and classification, characteristics, antigenic structure, pathogenicity factors. Salmonellosis and Typhoid (enteric) fever: pathogenesis, immunity, microbiological diagnosis, prevention.
71. Shigella: classification, characteristics, antigenic structure, pathogenicity factors. Bacterial dysentery: pathogenesis, immunity, microbiological diagnosis, prophylaxis.
72. Food poisoning of microbial etiology: classification, etiology, pathogenesis, principles of microbiological diagnosis, prophylaxis.
73. Klebsiella: classification, characteristics, antigenic structure, pathogenicity factors, Klebsiella diseases. Healthcare-associated Klebsiella: antibiotic resistance, role in infectious pathology.
74. *Pseudomonas aeruginosa*: general characteristics, pathogenicity factors, role in human pathology. Acinetobacter: characteristics, role in human pathology.
75. Campylobacter: general characteristics, role in human pathology. Helicobacter: characteristics, pathogenicity factors, role in human pathology, principles of diagnosis and therapy of helicobacteriosis.
76. Corynebacterium: classification, characteristics, pathogenicity factors. Diphtheria: pathogenesis, immunity, microbiological diagnostics, principles of treatment of diphtheria, prophylaxis. Manifestation of diphtheria in oral cavity.

77. *Bordetella*: classification, characteristics, antigenic structure, pathogenicity factors. Whooping cough: pathogenesis, immunity, microbiological diagnosis, prophylaxis. Principles of treatment.
78. *Haemophilus spp.*: characteristics, role in pathology, prophylaxis of Hib-infection.
79. Actinomycetes: systematics, general characteristics, role in the pathology of the maxillofacial region. Cervical-maxillofacial actinomycosis: pathogenesis, immunity, principles of microbiological diagnostics, prevention.
80. Mycobacteria: classification, characteristics, pathogenicity factors. Tuberculosis: pathogenesis, immunity, principles of microbiological diagnosis and chemotherapy (multidrug resistance and extensively drug-resistant tuberculosis, MDR-TB, XDR-TB), immunoprophylaxis. Manifestations of tuberculosis in the oral cavity.
81. Obligate anaerobes. Classification and characteristics. Clinical signs of anaerobic infection. Specimen collection algorithm in case of suspected anaerobic infection.
82. Gas gangrene *Clostridium spp.*: classification, characteristics, pathogenicity factors. Gas gangrene: pathogenesis, immunity, drugs for immunoprophylaxis and serotherapy.
83. *Clostridium tetani*: systematics, characteristics, pathogenicity factors. Tetanus: pathogenesis, immunity, microbiological diagnosis, prevention, principles of treatment.
84. *Clostridium botulinum*: characteristics. Botulinum toxin, mechanism of action. Foodborne botulism, epidemiology, principles of immunotherapy.
85. Non-spore-forming anaerobes: classification, characteristics, role in the pathology of the oral cavity. Principle of bacteriological diagnostics of infections caused by non-spore-forming anaerobes.
86. Quarantine infections: characteristics, classification. Principles of collection, transportation and investigation of specimens with biosafety levels 3 and 4 pathogens (BSL-3, BSL-4).
87. *Vibrio*: classification, characteristics, antigenic structure, pathogenicity factors. Cholera: pathogenesis, immunity, microbiological diagnosis, prophylaxis, principles of treatment. The role of non-cholera vibrios in human pathology.
88. Plague, tularemia: classification and characteristics of causative agents, pathogenicity factors, microbiological diagnosis, prophylaxis, principles of treatment.
89. *Brucella*: classification, general characteristics. Human brucellosis: pathogenesis, immunity, prevention. Bacilli: classification, characteristics. The causative agent of anthrax: properties, pathogenicity factors. Anthrax in humans: pathogenesis, prevention, manifestations in the oral cavity.
90. Spirochetes: classification, characteristics. Leptospirosis: characteristics of causative agent, pathogenesis. *Borrelia spp.*: role of in human pathology. Lyme borreliosis: etiology, pathogenesis, immunity, microbiological diagnosis, prophylaxis.
91. Treponemas: general characteristics, classification. The causative agent of syphilis: characteristics, antigenic structure, pathogenicity factors. Pathogenesis of syphilis,

principles of microbiological diagnostics in different periods of the disease, manifestations in the oral cavity.

92. Treponemas of oral cavity and their role in pathology. Fusospirochetosis: etiology, characteristics of pathogens, pathogenesis, clinical forms, principles of treatment.
93. Chlamydia: classification, characteristics, lifecycle, antigenic structure, pathogenicity factors, role in pathology.
94. *Mycoplasma spp.*: classification, characteristics, the role of mycoplasmas and ureaplasmas in human pathology.
95. Rickettsia: classification, characteristics, role in pathology.
96. Pathogenic fungi: classification, characteristics. Mycoses: promoting factors and conditions. Role in human pathology. Principles of treatment and prophylaxis of mycoses.
97. Virology: definition, objects and methods of research. Historical overview of virology as a science. Distinctive features of viruses. Systematic position and classification of viruses. Prions, role in human pathology.
98. Forms of existence of viruses. Morphology and biochemical structure of virions. Structure, function and properties of virion nucleic acid, proteins, lipids and carbohydrates.
99. Interaction of the virus and susceptible cell. Strict parasitism and cytotropism of viruses. Cell receptors for viruses. Viral genome organization. Reproduction strategy of DNA and RNA viruses.
100. Types of viral infection of cell. Changes in the host cell in the process of a viral infection. Peculiarities of viral infections of an organism. Acute, chronic and slow infection. Local and systemic mechanisms of antiviral immunity. Factors of innate and adaptive antiviral immunity. Interferons: classes, properties, mechanisms of antiviral activity.
101. Principles of etiologic diagnostics of viral infections. Rapid methods. Serological diagnostics: principles. Principles of viral infections chemotherapy. Groups of antiviral drugs.
102. Cultivation of viruses. Indication and identification of viruses.
103. The aetiology of acute respiratory viral infections. Influenza viruses: classification, characteristics, antigenic structure. Influenza: pathogenesis, immunity, prevention, etiologic diagnostics of influenza, chemotherapy and chemoprophylaxis of influenza.
104. Paramyxoviruses, characteristics and classification of the family. Parainfluenza viruses, manifestations of the disease. Pneumovirus: structure, properties, pathogenicity for humans.
105. Mumps and measles viruses: structure, properties, manifestations of the disease in the oral cavity and maxillofacial region.
106. Coronaviruses: classification, characteristics. Coronaviruses SARS-CoV and MERS-CoV, role in human pathology.

107. Coronavirus SARS-CoV-2: taxonomy, characteristics. COVID-19: pathogenesis, immunity, etiological diagnosis, prevention, epidemic situation in the world.
108. Rabies virus: classification, characteristics, specific inclusion. Rabies: pathogenesis, etiologic diagnosis, prevention.
109. Rubella virus: characteristics. Rubella: pathogenesis, prevention. Congenital rubella syndrome.
110. Hepatitis A virus: characteristics. Hepatitis A: pathogenesis, immunity, etiologic diagnosis, prevention.
111. Hepatitis B virus: systematics, characteristics. Viral hepatitis B: pathogenesis, etiological diagnosis, principles of therapy and prevention. Hepatitis B immunization in healthcare workers, control of post-vaccination immunity. Hepatitis D virus: characteristics, role in pathology, prevention.
112. Hepatitis C virus: systematics, characteristics. Viral hepatitis C: pathogenesis, principles of diagnosis, therapy and prevention.
113. Retroviruses. Human immunodeficiency virus (HIV): virion morphology, genome, antigenic structure. HIV infection: pathogenesis, immunity, etiologic diagnostics, principles of therapy, prophylaxis. AIDS-defining illnesses. Oral manifestations associated with HIV/AIDS.
114. Herpesviruses: classification, characteristics. Human diseases caused by herpes simplex viruses: pathogenesis, immunity, principles of therapy, prevention.
115. Varicella (chicken pox) and herpes zoster (shingles): etiology, pathogenesis, principles of therapy, prevention. The role of Human Herpesviruses types 4-8.
116. Adenoviruses: classification, characteristics. Adenoviral infections: pathogenesis, immunity, etiological diagnosis. Papillomaviruses: characteristics, role in pathology, prevention.
117. Dental microbiology: definition, objectives. General principles of microbiological diagnosis of dental diseases.
118. The microbiota of the oral cavity (indigenous, transient). The role of normal microbiota of the oral cavity (positive and negative). Dysbiosis of the oral cavity: causes, manifestations, prevention, principles of correction.
119. Ontogeny of normal oral microbiota. Influence of environmental factors, physiological features of the oral cavity, and other factors of the host on the microbiota of the oral cavity.
120. Representatives of the normal microbiota of the oral cavity: aerobes and facultative anaerobes, their role. Oral streptococci: general characteristics, groups.
121. Representatives of the normal oral microbiota: anaerobes, their role.
122. Representatives of the normal oral microbiota: spiral-shaped bacteria, mycoplasma, protozoa, fungi, and their role.
123. Microbiota of specific areas of the mouth: saliva, dorsum of the tongue, periodontal sulcus, mucous membranes. Features of these biotopes affecting microorganisms.

124. Methods of study of oral microbiota. Methods of sampling material in dental diseases. Nutrient media for the isolation of cariogenic streptococci, lactobacilli.
125. Nonspecific mechanisms of defense of the mucous membranes, saliva, gingival fluid, tooth enamel, system of polymorphonuclear leukocytes.
126. Functions of saliva. Antimicrobial factors of saliva.
127. Mechanisms of acquired immunity of the oral cavity. Local immunity in the oral cavity. Functions of secretory immunoglobulins A.
128. Dental plaque: the stages of formation, microorganisms-colonizers. Plaque as a biofilm. Dental plaque formation control. Quorum sensing. New approaches to reduce the bioburden of the plaque.
129. Caries etiology. Cariogenicity criteria. Cariesogenic streptococci: species, characteristics. Characteristics of lactobacilli. Associated microorganisms. The role of the macroorganism in the development of caries.
130. Pathogenesis of caries: mechanisms of streptococci adhesion (carbohydrate-dependent and carbohydrate-independent), mechanisms of destruction of tooth tissues. The role of streptococci in coaggregation. Glucans. Prophylaxis of caries. Fluorides and their influence on microorganisms.
131. Odontogenic inflammation: etiology, types and phases of inflammation. Chronic odontogenic infection. Immunological aspects of the relationship between inflammatory periodontal diseases, cardiovascular, and rheumatic diseases.
132. Types of microorganisms and their role in the etiology and pathogenesis of pulpitis, acute and chronic apical periodontitis, periostitis, osteomyelitis, abscesses and phlegmon of soft tissues.
133. Periodontal diseases: classification, risk factors for development. The role of microorganisms in the etiology and pathogenesis of gingivitis. Dynamics of microbiota of implants in case of successful and complicated implantation.
134. Theories (hypotheses) about dental plaque role in the development of periodontal diseases. The role of microorganisms in the formation of dental calculus.
135. General properties of periodontopathogenic microorganisms. Criteria of periodontopathogenicity. The red complex microorganisms (*Porphyromonas gingivalis*, *Tannerella forsythia*, *Treponema denticola*): characteristics, pathogenicity factors, their role in the pathogenesis of periodontitis.
136. Microorganisms of yellow, orange, and green complexes, their role in the development of periodontal diseases. Characteristics of *Aggregatibacter actinomycetemcomitans*, pathogenicity factors, the mechanism of invasion and persistence, a role in the development of periodontitis.
137. Immune mechanisms in periodontal diseases. Mechanisms of tissue protection from microbial invasion. Principles of prevention and treatment of periodontitis.
138. Inflammatory diseases of the oral mucosa: specific and nonspecific bacterial stomatitis.
139. Viral stomatitis and manifestations of viral infections in the maxillofacial region.

140. *Candida*: systematics, characteristics, pathogenicity factors. Candidiasis: predisposing factors for development, methods of diagnosis, principles of treatment and prevention.
141. Manifestations of allergic and immunodeficiency conditions in the oral cavity. Recurrent aphthous stomatitis.
142. Dental Clinical Microbiology. Opportunistic pathogens. Common features of opportunistic pathogens and infections, their pathogenesis. Microbiological diagnosis of opportunistic infections. Criteria of etiological significance of opportunistic pathogen.
143. Etiology and principles of microbiological diagnosis of opportunistic diseases of skin, subcutaneous tissue, bronchopulmonary tract infections of stomatogenic origin.
144. Etiology and principles of microbiological diagnosis of bacteremia, sepsis of stomatogenic origin.
145. Nosocomial infections (Health Care Associated Infections): definition of the term, etiology, incidence and spread, principles of microbiological diagnosis, prevention. Infection control in dentistry.

PRACTICAL SKILLS EXAM

1. Prepare fixed smear from broth culture of bacteria and stain it with Gram method.
2. Prepare fixed smears from agar culture of bacteria and stain it with Gram method.
3. Perform immersion microscopy and determine the morphology of *Staphylococcus* (pure culture, Gram stain).
4. Perform immersion microscopy and determine the morphology of *Streptococcus* (pure culture, Gram stain).
5. Perform immersion microscopy and determine the morphology of *Bacillus* (pure culture, Gram stain).
6. Perform immersion microscopy and determine the morphology of *Candida* (pure culture, Gram stain).
7. Perform immersion microscopy and determine the morphology of *Escherichia coli* (pure culture, Gram stain).
8. Perform immersion microscopy and determine the morphology of the mixture of *Staphylococcus aureus* and *Escherichia coli* (Gram stain).
9. Perform immersion microscopy and determine the morphology of *Klebsiella* (pure culture, Burri-Gins stain).
10. Perform immersion microscopy and determine the morphology of *Corynebacterium diphtheriae* (pure culture, Loeffler stain).
11. Perform immersion microscopy and determine the morphology of *Neisseria gonorrhoeae* in pus, Gram stain.
12. Perform immersion microscopy and determine the morphology of *Mycobacterium* in sputum, Ziehl-Nielsen stain.
13. Determine and interpret the disk diffusion method results for the assessment of antimicrobial susceptibility of bacteria.
14. Perform the slide agglutination test for seroidentification of enterobacteria.
15. Determine and interpret the results of the passive (indirect) hemagglutination test to evaluate the immunity to diphtheria.
16. Determine and interpret the results of the hemagglutination inhibition test for serodiagnosis of viral infection.
17. Determine and interpret the results of the hemagglutination inhibition test for influenza virus seroidentification.

Reviewed and approved on June, 3, 2025 (protocol No. 18).

Head of the department
of Microbiology, virology,
immunology



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