

**«СОГЛАСОВАНО»**

Председатель методической комиссии  
медицинского факультета  
\_\_\_\_\_ Н.В. Смирнова

Протокол N \_\_\_\_\_

от « \_\_\_\_ » \_\_\_\_\_ 2025 г.

**«УТВЕРЖДАЮ»**

Декан медицинского факультета

\_\_\_\_\_ В.Н. Диомидова

от « \_\_\_\_ » \_\_\_\_\_ 2025 г.

**Перечень экзаменационных вопросов (задач, тестов и др.)  
по дисциплине: «Microbiology, Virology»  
для студентов II курса по специальности «Стоматология» "Dentistry"  
2024/2025 учебного года**

1. Medical microbiology, the subject and tasks of its study.
2. Microscope invention and microbes discovery. Antony van Leeuwenhoek.
3. Founders of microbiology as a scientific discipline: Louis Pasteur, Robert Koch.
4. Viruses discovery by Dmitry Iwanowski, the value of this discovery for biology and medicine.
5. The works of Elie Metchnikoff and of Paul Ehrlich, their meaning.
6. Microbiological laboratory and lab equipment. Working rules in the microbiological laboratory.
7. Diagnostic methods used for identifying and classifying bacteria.
8. Light microscopy: bright-field (light), dark-field, phase-contrast, and fluorescent microscopy. Electron microscopy.
9. The technique of preparing smears and preparations. Native and stained preparations. Positive stain. Negative stain.
10. Aniline dyes and their use in microbiology. Simple and differential staining techniques.
11. Gram staining. The steps of the Gram stain procedure.
12. Ziehl-Neelsen staining.
13. Neisser staining.
14. Silver impregnation staining and Giemsa staining.
15. Microorganisms classification. The main differences between prokaryotes and eukaryotes.
16. Principles of bacterial classification. Bergey's Manual of Determinative Bacteriology. Serovar, phagovar. Culture, colony, strain, clone.
17. Bacterial morphology. Bacteria with a cell wall (cocci, rods, curved shaped) and not having a cell wall.
18. Bacterial cell structures: obligatory organelles (nucleoid, cytoplasm, cytoplasmic membrane, mesosome, cell wall, ribosome) and optional organelles (plasmids, flagella, capsule, endospore, fimbriae and pili).
19. The structure of cell wall. Cell wall-defective bacteria: protoplasts, spheroplasts, L-forms.
20. Bacterial spores and sporulation in bacteria. Ozheshki staining.
21. Bacterial capsules. Burry-Hins and negative staining.
22. Bacterial motility and methods of its study. Loeffler staining.
23. Classification, morphology and structure of actinomycetes.
24. Classification, morphology and structure of spirochetes.
25. Classification, morphology and structure of mycoplasmas.
26. Classification, morphology and structure of rickettsia.
27. Classification, morphology and structure of chlamydia.
28. Classification, morphology and structure of fungi.

29. Classification, morphology and structure of protozoans.
30. Microorganisms nutrition types. Growth factors.
31. Bacterial aerobic and anaerobic respiration. Obligate aerobe, obligate anaerobe and facultative anaerobe.
32. Microbial enzymes, their classification.
33. Growth of microorganisms on liquid and solid culture media. Microorganisms reproduction. Bacterial division. Phases of bacterial culture growth curve.
34. Conditions required for bacterial cultivation or growth. Uncultivated forms of bacteria.
35. Culture media, their classification. Enrichment, selective and differential/indicator media.
36. Steps of bacteria culturing in vitro. Identification of bacteria.
37. Cultural (or colonies) characteristics. Bacterial count.
38. Biochemical reactions. Sugar fermentation test. Tests for fermentation of protein and amino acids.
39. Methods of isolating bacterial pure cultures with aerobic respiration.
40. Anaerobic culturing methods. Features of isolating bacterial pure cultures with anaerobic respiration.
41. The influence of environmental factors on microbes. Microbial communities. Relationships of microorganisms.
42. Sterilization and disinfection methods.
43. Microflora of water. Sanitary-indicator microbes. Methods of the sanitary quality examination of water.
44. Microflora of soil. Sanitary-indicator microbes. Methods of the sanitary quality examination of soil.
45. Microflora of air. Sanitary-indicator microbes. Methods of the sanitary quality examination of air.
46. Human's body microbiota: resident microbiota and transient microbiota, its value (beneficial and harmful effects).
47. Characteristic of human's body microbiota at various sites (skin, upper respiratory tract, gastrointestinal tract, genital tract, conjunctiva).
48. Eubiosis and dysbiosis. Laboratory diagnosis, correction and prevention of dysbiosis. Approaches to the normalization of dysbiosis: eubiotics (probiotics), prebiotics and bacteriophages.
49. General characteristics of the oral microbiota.
50. Microbiota of the oral cavity main biotopes: mucous membrane, salivary glands, gingival crevice and gingival fluid, saliva and dental plaque. Immune defense.
51. Biofilm (=dental plaque), tartar (=dental calculus), and dental caries. The mechanisms and role of oral microorganisms of their formation. Cariogenic *Streptococcus mutans*, its characteristic.
52. Formation of periodontal diseases (gingivitis and periodontitis). Prevention of the dental diseases. Oral cavity hygiene.
53. Classification, properties and structure of viruses. Virions chemical composition.
54. Viruses replication. Virus-host cell interactions. The steps of viral life cycle.
55. Methods of viruses cultivation. Indication and identification of viruses. Cytopathic effect of viruses in cell culture.
56. Bacteriophage, its main properties. Phage interaction with the bacterial cell. Bacteriophages life cycles: lytic and lysogenic cycle. Lysogenic conversion.
57. Obtaining of bacteriophages. Bacteriophages activity determination.
58. Bacteriophage using. Phage typing. Temperate phage as a cloning vector.
59. Prions, their structure and properties.
60. The organization of genetic material in bacteria. Chromosomal DNA. Genotype. Phenotype. Bacterial genome maps.

61. Extrachromosomal genetic elements: plasmids, transposons, insertion sequences (IS). Plasmid classification and functions.
62. Mutations, their classification. Physical, chemical and biological mutagens. Reparations.
63. Genetic recombinations: conjugation, transformation, transduction.
64. Phenotypic variation or modifications. R-S - dissociation.
65. Bacteriocins concept.
66. Using of molecular methods to microbial DNA/RNA identification: nucleic acid probing, poly-merase chain reaction, restriction fragment polymorphism analysis.
67. Genetic engineering, its application in medicine.
68. Infection. Chains of the infectious process.
69. Definition, conditions for the infection occurrence. Pathogens types. Sources and modes of infection transmission.
70. Pathogenesis stages.
71. Classification (types or forms) of infection and their characteristics.
72. Infectious disease periods.
73. Pathogenicity, virulence and toxicity of microorganisms.
74. Virulence factors (=determinants of virulence) of microbial pathogens: surface structural sub-stances and exoenzymes. Adhesins. Invasins. Aggressins. Modulins.
75. Characteristic of bacterial toxins: exotoxins and endotoxin.
76. Genetic control of virulence and toxin formation.
77. Diagnostic animal tests.
78. Antimicrobial drugs. Classification by origin and mechanisms of action.
79. Mechanisms of antimicrobial drug resistance and ways to overcome.
80. Antimicrobial resistance (=sensitivity) tests. Disc diffusion tests on agar plate (Kirby-Bauer, Stokes, primary disc diffusion method) and tube dilution series tests. Minimum inhibitory concentration (MIC).
81. Antiviral drugs, mechanisms of their action.
82. Active immunization. Vaccines classification. Toxoids. Their production and use.
83. Passive immunization. Sera and immunoglobulins. Antisera, their use.
84. Direct and indirect immunological diagnosis. Immunological reactions and assays to detecting antigen-antibody complexes: agglutination assay, hemagglutination and hemagglutination inhibition assays, precipitation assay, complement fixation test, neutralization assay, enzyme immunoassay, immunofluorescence tests.
85. Staphylococci, classification, their properties, pathogenesis, features of treatment, prevention and microbiological diagnosis of staphylococcal infections. Manifestations of these infections in the oral cavity. Multidrug resistance. Cariogenic cocci: Peptococcus, Peptostreptococcus, Veillonella.
86. Streptococci, classification, their properties, virulence factors, pathogenesis, features of treatment, prevention and microbiological diagnosis of streptococcal infections. Pneumonia. Scarlet fever: manifestations in the oral cavity. Role of oral cocci in the caries and dental plaques etiology.
87. Meningococci, classification, their properties, virulence factors, pathogenesis, features of treatment, prevention and microbiological diagnosis of meningococcal infections.
88. Causative agents of tuberculosis: classification, properties, virulence factors. Pathogenesis, features of treatment, prevention and microbiological diagnosis of tuberculosis. Manifestations in the oral cavity. Multidrug resistance.
89. Causative agents of diphtheria, their classification, properties, virulence factors. Pathogenesis, features of treatment, prevention and microbiological diagnosis of diphtheria. Manifestations in the oral cavity.
90. Causative agents of pertussis (or whooping cough): classification, properties, virulence factors; pathogenesis, features of treatment, prevention and microbiological diagnosis of pertussis.

91. Causative agents of actinomycosis: classification, properties, pathogenesis, features of treatment, prevention and microbiological diagnosis of actinomycosis. Manifestations in the oral cavity.
92. Causative agents of gas anaerobic infection: classification, properties, virulence factors. Pathogenesis, features of treatment, prevention and microbiological diagnosis of gas anaerobic infection.
93. Causative agents of tetanus, their properties, virulence factors; pathogenesis, features of treatment, prevention and microbiological diagnosis of tetanus.
94. Botulism pathogen: properties, virulence factors. Pathogenesis and microbiological diagnosis of botulism.
95. Causative agents of non-clostridial anaerobic infection: *Bacteroides*, *Fusobacterium*, *Leptotrichia*, *Prevotella*, *Porphyromonas*: classification, properties. Pathogenesis, microbiological diagnosis of the diseases they cause. Manifestations in the oral cavity.
96. *Pseudomonas*: properties, virulence factors; pathogenesis, features of treatment, prevention and microbiological diagnosis of diseases caused by them. Multidrug resistance.
97. Enteropathogenic *Escherichia coli*, their properties, virulence factors. Antigenic structure of *Escherichia*. Pathogenesis, features of treatment, prevention and microbiological diagnosis of colenteritis.
98. *Salmonella* species are causative agents of typhoid fever and paratyphoid fever, their properties. Pathogenesis, features of treatment, prevention and microbiological diagnosis of typhoid fever and paratyphoid fever. Antigenic structure of salmonellae. Serological and biochemical identification of isolating pure culture. Serotyping by Kauffmann-White scheme.
99. Enteric salmonellae are causative agents of foodborne intoxication and nosocomial diseases. Pathogenesis, features of treatment, prevention and microbiological diagnosis of diseases caused by them.
100. *Shigella*, classification and properties. Pathogenesis, features of treatment, prevention and microbiological diagnosis of bacterial dysentery. *Proteus*, features of microbiological diagnosis.
101. *Vibrio cholera*, classification, properties, virulence factors. Pathogenesis, features of treatment, prevention and features of microbiological diagnosis of cholera.
102. Gonococci, classification, properties, virulence factors. Pathogenesis, features of treatment, prevention and microbiological diagnosis of gonorrhea and ophthalmic neonatorum (= blenorhea). Gonococcal stomatitis.
103. *Treponema*, classification, properties, virulence factors. Pathogenic and resident spirochetes. Pathogenesis, features of treatment, prevention and microbiological diagnosis of syphilis. Manifestations of syphilis in the oral cavity. Ulcerative-necrotic gingivostomatitis.
104. Chlamydia, classification, properties. Pathogenesis, features of treatment, prevention and microbiological diagnosis of urogenital chlamydiosis.
105. Yeast-like fungi *Candida*, classification, properties. Dimorphism. The risk factors associated with candidiasis, their manifestations in the oral cavity. Oral thrush. Pathogenesis, features of treatment, prevention and microbiological diagnosis of candidiasis.
106. Influenza viruses, their structure and properties. Antigenic variation. Pathogenesis, features of treatment and prevention of influenza. Viral diagnosis: detection and identification. Hemagglutination and hemagglutination inhibition tests.
107. Causative agents of acute respiratory viral infections: paramyxoviruses: parainfluenza viruses, respiratory syncytial viruses, measles viruses, mumps viruses; coronaviruses, adenoviruses, rhinoviruses, their structure and properties. Pathogenesis, features of treatment, prevention and diagnosis of diseases caused by them. Infection forms. Common cold, severe acute respiratory syndrome (SARS) and viral pneumonia. Causative agents of slow infections.
108. Rubiviruses, its structure and properties. Teratogenic effect of rubella virus. Pathogenesis, features of treatment, prevention and diagnosis of rubella.

109. Herpes viruses, its structure, classification, properties. Pathogenesis, features of treatment and diagnosis of infections caused by herpes viruses and herpes simplex viruses. Oncogenic herpes viruses as causative agents of malignancies. Herpetic gingivostomatitis.
110. Varicella-zoster virus, its properties. Pathogenesis and diagnosis of varicella or chickenpox and herpes zoster.
111. Hepatitis A and E viruses, their structure, properties. Pathogenesis and diagnosis of diseases caused by them.
112. Hepatotropic viruses: hepatitis B, C, D. viruses, their structure, properties. Pathogenesis and diagnosis of diseases caused by them. Prevention of hepatitis B. Significance in the pathology of the maxillofacial region. Danger of infection in the dental office.
113. Human immunodeficiency viruses: structure and properties. Pathogenesis and clinical picture. Danger of infection in the dental office.
114. Picornaviruses (Enteroviruses) and rotaviruses, their structure. Polioviruses, coxsackieviruses, echoviruses and rotaviruses, their properties. Pathogenesis and diagnosis of diseases caused by them. Herpangina.
115. Rabdoviruses, its structure, properties. Pathogenesis and diagnosis of diseases caused by rabies virus and vesicular stomatitis virus.
116. Bacterial infections. Opportunistic infections. Bacterial infections of the oral cavity. Fungal infections.
117. Viral infections. Slow viral infections. Latent viral infections. Viral infections of the oral cavity.
118. Oncogenic viruses: general characteristics and classification. Mechanisms of viral carcinogenesis.
119. Slow prion or conformational infections.
120. Hospital-acquired or nosocomial infections.

**Вопросы обсуждены на заседании кафедры медицинской биологии с курсом микробиологии и вирусологии. Протокол № 7 от «21» марта 2025 года.**

Зав. кафедрой медицинской биологии  
с курсом микробиологии и вирусологии

Н.В. Смирнова