**EXAMINATION QUESTIONS AND LIST OF MICROSLIDES, PRACTICAL SKILLS AND TASKS**

**ON MICROBIOLOGY, VIROLOGY AND IMMUNOLOGY**

**FOR STUDENTS OF SPECIALITY «GENERAL MEDICINE»**

**Examination Questions**

**on Microbiology, Virology and Immunology**

**for students of speciality «General medicine»**

1. Definition of microbiology as the science. Branches of microbiology: general, medical, veterinary, technical, agricultural, ocean, space microbiology. Medical microbiology and its sections: bacteriology, virology, protozoology, mycology.
2. Stages of development of Microbiology, its branches. Medical Microbiology. History and scope. Impact in Microbiology made by L. Pasteur.
3. Origin and evolution of microorganisms. Modern classification of procaryotes. Bacterial taxonomy. Main taxons. Species as the main taxonomic unit.
4. Morphology and bacterial structure. Role of bacterial components of bacterial cells in vital activity of bacteria and pathogenesis of infectious diseases. Differences between procaryotic and eukariotic cells.
5. Chlamydiae. Classification. C.psittaci, C.trachomatis, C.pneumoniae. General properties. Life cycle. Cultivation of chlamydiae.
6. Morphology of Rickettsia. Methods of staining of Rickettsia.
7. Staining of bacteria. Dyes used in microbiology. Differential stains. Gram’s stain. Principle. Procedure. Mechanisms: chemical and physical theories.
8. Metabolism of microorganisms. Bacterial nutrition. Classification of bacteria on the basis of nutritional requirements.
9. History of discovery of viruses. D.I.Ivanovsky as the founder of virology. Stages of development of virology. Morphology and viral ultrastructure. Types of symmetry. Chemical composition. Functions of viral subunits.
10. Sterilization, disinfection, and antisepsis. Methods of sterilization. Methods of disinfection. Classification of disinfectants. Chemical disinfectants.
11. Bacterial growth and multiplication. Phases of bacterial growth, starting with an inoculum of stationary phase cells.
12. Enzymes of microorganisms. Role of enzymes in metabolism, the conversion of energy and pathogenicity of bacteria.
13. Antibiotics. History of discovery. Role of A.Fleming. Classification. General criteria for effective antibiotic action. General principles of effective antibacterial therapy.
14. Normal microflora of the human body. Role of normal microflora in the physiological and pathological processes. Gnotobiology. Role of I.I. Metchnicoff in the development of study of normal microflora. Dysbacteriosis and causes of its origin.
15. The notion of chemotherapy and chemotheraupeutic agents. Chemotheraupeutic index. Mechanism of antibacterial action of Sulfonamides. Role of P.Erlich and T.Domagk in the development of study of chemotherapy.
16. Pure cultures of microorganisms, their significance for the theory and practice of microbiology. Principles of isolation and identification of pure cultures.
17. Extra chromosomal genetic elements of bacteria. Plasmids, their properties and classification. Transposable genetic elements:insertion sequences and transposons.
18. Viruses. Definition and properties. Classification. Morphology of viruses. Virion structure. Chemical properties. Functions of viral components.
19. Culture and isolation of viruses. Types of cell cultures: primary, diploid and heteroploid cultures. Detecting viral growth in cell cultures.
20. Bacterial metabolism and the conversion of energy Respiration of bacteria. Anaerobes. Methods of anaerobic culture. Anaerobic jar. GASPAK.
21. Clinical microbiology. Collection and transport of clinical specimens. Specimen containers and their transport. Handling of speciment in the laboratory. Selection of laboratory investingations.
22. Achivements in microbiology. Modern methods of detection of pathogen-specific macromolecules. Detection of nucleic acid sequences: nucleic acid probe tests, polymerase chain reaction.
23. Modern views on the nature and origin of viruses. Position of viruses in the system of the alive. Means of classification and naming of viruses. Families of DNA viruses. Families of RNA viruses. Some important members.
24. Bacteriophage. History of its discovery. General characteristics. Structure and replication. Types of bacteriophage infection: virulent (lytic) and temperate (lysogenic) infections. Phage typing of bacteria. Using bacteriophages for phage therapy and phage prophylaxis.
25. Types of viral infection of a cell: abortive, lytic, and persistent infections. The stages of viral infection. The viral replication cycle: recognition of and attachment to the target cell, penetration, uncoating, macromolecular synthesis, assembly, release.
26. Enzymes of microorganisms, classification, their role in metabolism. Use for identification of bacteria. Enzymes of pathogenicity.
27. Host defenses against viral infection: natural barriers, nonspecific immune defenses, antigen-specific immune responses. Viral immunopathogenesis.
28. Viral detection: hemadsorption, hemagglutination. Hemagglutination inhibition test. Mechanism and tecnique. Interpretation of results.
29. Study of morphology of bacteria. Optical methods: oil immersion microscopy, phase contrast microscopy, dark ground microscopy. Staining of bacteria.
30. Capsule. Functions. Demonstration of capsule. Capsular stain. India ink method (after Burri-Gience).
31. Spirochetes. Taxonamy, classification, general properties, morphological sturture. The most common pathogens.
32. Bacterial taxonomy. Modern principles of bacterial classification: division, class, order, family, tribe, genus, species. Nomenclature and main taxons. The species concept in bacteriology.
33. Chemical composition of bacterial cell. Essential elements, their sources, and functions in Prokaryotes. Nucleic acids, proteins, lipids, and carbohydrates, their biosynthesis and functions.
34. Bacterial methabolism. Nutritional requirements of bacteria. Culture media. The basic requirement to culture media. Classification of media.
35. Bacterial structure. Differences between prokaryotic and eukakyotic cells. Cell envelope, cytoplasmic components, external structures (capsules, flagella, and pili) of bacterial cell.
36. Dyes used for bacterial spore staining. Spore staining. Modified acid fast techniques (Gansen΄s method).
37. Cultivation of viruses. Animal inoculation indication of the viruses in inoculated animals.
38. Discovery of viruses. Main stages in the development of virology. Modern classification of viruses.
39. Achivements in microbiology. R.Koch as the founder of microbiology.
40. Acid fast bacteria. Ziehl Neelsen stain. Principle and technique.
41. Bacterial metabolism. Respiration of bacteria. Classification of bacteria according to type of respiration. Anaerobes. Anaerobic culture methods of isolating anaerobic pure cultures.
42. Viral replication. Relationship between the virus and the host cell. Stages of viral replication. Replication cycle of human DNA viruses. Replication cycle of human RNA viruses.
43. Spores. Structure of spores. Function. Formation of spores. Types of bacterial spores. Spore stain.
44. The family Mycoplasmataceae. Classification. General characteristics. Morphological properties and culture. Staining of mycoplasma.
45. Protozoa. Classification. General characteristics. Morphological properties. Microscopic detection: blood samples, tissue samples, sputum samples. Specimen collection. Examination. The Romanovsky-Giemsa staining.
46. Cell envelope. Components. Cell wall. Structure in Gram-positive and Gram-negative bacteria. Functions. Differential stains. Gram΄s stain.
47. Flagella. Basal structure of bacterial flagellum. Types of flagellar arrangement. Fimbriae (pili). Functions. Demonstration. Dark ground (field) microscopy. Staining techniques.
48. Protoplasts, spheroplasts, L.forms of bacteria. Morphology, type of growth. Role in the human pathology.
49. Pneumocystis carinii. Morphology and taxonomic status. Life cycle. Staining by Giemsa method.
50. Basic concepts in immunity. Central and periferal organs of the Immune System. Inductive and productive phases of immune response.
51. Basic concepts in Infection. Role of microorganisms in infectious proсess. Pathogenicity. Virulence. Factors predisposing to microbial pathogenicity. Doses and methods of their detection.
52. Immune System. Structure and functions. Cells of the Immune System. Classification. Characteristics. Cooperation of immunocompetent cells in immune response.
53. Live attenuated vaccines, principles of preparation, control. Practical use of live vaccines. Efficiency.
54. The study of infection. Dynamic of development of infectious diseases. Periods. Classification of infection: carriage, reinfection, superinfection, relapse (recurrence) infections.
55. Toxoides, their preparation, purification, units of measurement, use, efficiency.
56. Antibodies. Immunoglobulin types and structures. Antibody response: primary versus secondary (anamnestic) responses. Dynamic. Autoantibodies Monoclonal antibodies. Hybridomas.
57. Efficacy of antiparasitic immune responses.
58. Bacterial resistance to antibacterial agents: acquisition of bacterial resistance, mechanisms of bacterial resistance, bacterial resistance according to drug class. Antibiotic susceptibility. Minimal inhibitory concentration (MIC): methods for MIC determination, tube dilution, Kirby- Bauer disk diffusion test.
59. Hypersensitivity of delayed type (DTH). Mechanisms. Important characteristics of the types of DTH reactions. Skin allergic tests.
60. Immunity. Modern determination of the notion of "Immunity". Stages of the development of immunology. Types of immunity and forms of its manifastation.
61. Nonspecific defense mechanisms. Phagocytosis. Phagocytic cells. Steps of phagocytosis. Complete and incomplete phagocytosis.
62. Immunoglobulin classes, their structure and properties. Complete and incomplete antibodies. Immunoglobulin specificities.
63. Nonspecific defense mechanisms: local and systemic. The complement system: components of complement (C), classical and alternative pathways of C activation, biological effects of C, deficiencies of the complement system.
64. Interferons and antiviral agents. Classes of antiviral agents. Sites of action of antiviral compounds. Types of interferons. Mechanism of action. Clinical uses. Resistance to antiviral agents.
65. Genetics of microorganisms. Organization of the genetic bacterial apparatus. Genotypical and phenotypical variation of microorganisms, its practical significance. Dissociation in bacteria.
66. Precipitation reaction. Mechanism of precipitation. Applications of precipitation reaction. Electroimmunodiffusion.
67. Reactions with "labelled" antibodies and antigens. Immunofluorescence: direct and indirect. The flow cytometer.
68. Serologic testing. General considerations. Clinical applications. Interpretation. Complement fixation tests. Technique, purpose, and clinical examples.
69. Serologic testing in virology. General considerations. Virus neutralization tests. Techniques. Practical guidelines.
70. Bacterial mutation. Origins. Types. Detection. Mutation repair mechanisms. Mutation suppression.
71. Types of vaccines. Classification. Recombinant vaccines. DNA vaccines.
72. Humoral immune response. Steps of the antibody production. Primary and secondary (anamnestic) responses. Immunological memory, its mechanism.
73. Immunology of malignancy. Tumour antigens. Immune response in malignancy. Immunotherapy of cancer.
74. Passive immunoprophylaxis and immunotherapy. Immune sera and immunoglobulins. Classification. Principles of preparing. Titration of antitoxic serum. Complication of usage of immune sera: anaphylactic reaction, serum sickness.
75. The notion of genofond, genotype, and phenotype. Types of variation in bacteria.
76. Antibiotic susceptibility testing. Minimal inhibitory concentration (MIC). Methods for MIC determination: tube dilution, Kirby-Bauer technique, B-lactamase tests.
77. Bacterial resistance to antibacterial agents: intrinsica and acquired resistance. Basic mechanisms of resistance to antibiotics. Mutation and transfer of resistance genes among bacteria.
78. Opportunistic microorganisms, biological properties, their role in the human pathology. Pseudomonas aeruginosa, Proteus spp. as the causative agents of nosocomical infection. General properties. Determinants of pathogenicity. Pathogenesis and clinical disease. Epidemiology. Laboratory diagnosis. Treatment and prevention.
79. Agglutination reaction. Mechanism of agglutination. Passive agglutination tests. Applications of agglutination reaction.
80. Genetic engineering and biotechnology. Common enzymes used in molecular biology (restrictases, polumerases, reverse transcriptases, lygases). Cloning of foreign DNA in vectors.
81. Cultiration of viruses. Embryonated eggs. Structure. Technigue of inoculation of specimens. Detecting viral growth in embryonated eggs.
82. Essence of antiviral immunity. Humoral immunity. Cell-mediated immunity. Pathologic consequences of the antiviral immune response. Evasion of the immune response.
83. Antigens. Complete antigens and haptens. Determinants of antigenicity. Antigenic structure of bacteria. Antigenic stucture of viruses.
84. The phenomenon of antagonism in microbes. Antibiotics, their definition. Classification of antibiotics according to their points and mechanisms of action.
85. Enzyme-linked immunosorbent assay (ELISA). Radioimmunoassay (RIA). Western blot analysis. Mechanisms and applications of the reactions.
86. Infection. Definition. Classification of infection. Types of infectious diseases: endemic, epidemic, and pandemic diseases.
87. Vaccines. Classification. Immunization schedules. Killed (inactivated) vaccines. Vaccines as immunotherapeutic agents.
88. Infection. Sources of infection in man. Methods of transmission of infection: contact, inhalation, ingestion, inoculation, insects. Congenital, iatrogenic infections.
89. Characters of pathogens. Pathogenicity, virulence. Bacterial virulence factors: capsules, adhesions, exoenzymes, toxins, invasiveness. Dlm. LD5o. Study the virulence and toxigenicity of microorganisms.
90. Structure and function of immune system. Central lymphoid system. Thymus. Functional classification of T cells. Bone marrow. Bursa of Fabricius. Peripheral lymphoid system: lymph nodes, spleen. Cells of lymphoreticular system.
91. Toxigenicity of microorganisms. Bacterial toxins. Distinguishing features exotoxins and endotoxins. Genetic basis of bacterial pathogenicity.
92. Laboratory diagnosis of viral infections. Culture and isolation. Serology. DNA hybridization.
93. Viral Genetics. Viral genomes. Viral mutation. Interaction between viruses. The role of genetic variation in the evolution of viruses.
94. Laboratory diagnosis of bacterial infections. Microscopic examination of patient specimens. Detection of pathogen-specific macromolecules. Culture and isolation of microorganisms. Serologic testing.
95. DNA transfer between bacteria. Conjugation. Transformation. Transduction.
96. Hypersensitivity. Classification of hypersensitivity reaction. Immediate hypersensitivity. Reaginic (anaphylaxis), cytolytic and cytotoxic types of reactions. Immune complex disease (serum sickness). Mechanisms and mediators.
97. Immunodeficiency diseases. Primary immunodeficies. Classification of primary immunodeficiency syndromes. Secondary immunodeficiency.
98. Activators and stimulators of immune functions: cytokines, lymphokines, and chemokines. Sources, major targets, and functions.
99. .Salmonella. Classification. S. typhi, S. paratyphi A and paratyhi B as the causative agents of enteric (typhoid and paratyphoid) fever. General properties. Determinants of pathogenicity. Pathogenesis and clinical disease. Epidemiology. Immunity. Laboratory diagnosis. Diagnosis of carriers. Treatment. Control and prevention.
100. Shigella. Taxonomy. Classification. General characteristics. Antigenic structure. Determinants of pathogenicity. Epidemiology. Pathogenesis and immunity of dysentery. Clinical syndromes. Laboratory diagnosis. Treatment, prevention, and control.
101. The family Micrococcaceae. Taxonomy, general properties, classification. The genus Staphylococcus. Classification, structure, culture, biochemical characteristics, antigenic structure, resistance to physico-chemical factors, determinants of pathogenicity. Pathogenesis and clinical disease. Laboratory diagnosis of staphylococcal infections. Immunity. Treatment. Control and prevention.
102. The Rickettsiaceae family. Classification. General characteristics. Epidemic typhus. R. prowazeckii: antigenic structure, determinants of pathogenicity, epidermiology, transmission, pathogenesis, and clinical disease, laboratory diagnosis, treatment, prevention, and control.
103. The Enterobacteriaceae family. Taxonomy, general properties. Classification. The genus Escherichia: culture, biochemical characteristics, antigenic structure, determinants of pathogenicity. Enteropathogenic E. coli Role in the human΄s pathology. Laboratory diagnosis of enterocolitis.
104. The genus Neisseria, general characteristics and classification. N. meningitidis (the meningococci): classification, culture and isolation, determinants of pathogenicity. Pathogenesis and clinical disease. Epidemiology, immunity. Laboratory diagnosis. Treatment. Chemo- and immunoprophylaxis. Differentiation of the meningococci and nasopharyngeal Gram negative diplococci.
105. The genus Neisseria. General characteristics. Classification. N.gonorrhoeae. Classification. Determinants of pathogenicity. Immunity. Pathogenesis and clinical disease. Epidemiology. Laboratory diagnosis. Treatment, control, and prevention.
106. The genus Streptococcus: general properties, classification. Streptococcus pneumoniae (the pneumococcus): general properties, classification, virulence factors. Pathogenesis and clinical disease. Epidemiology. Laboratory diagnosis Treatment. Control and prevention.
107. Chlamydiae. Classification. General properties. Life cycle. Determinants of pathogenicity. C. trachomatis. Serotypes. C. pneumonial. C. psittaci. Clinical disease. Epidemiology. Laboratory diagnosis. Treatment. Control and prevention.
108. The genus Streptococcus: general properties, classification. Group A streptococci (S. pyogenus). Group B streptococci (S. agalactiae). Determinants of pathogenicity: proteins, capsule, exotoxins, hemolysins, spreading factors. Pathogenesis and clinical disease of streptococcal infections. Laboratory diagnosis. Treatment. Control and prevention.
109. Leptospira. General properties. Classification. Pathogenesis and clinical disease of leptospirosis. Laboratory diagnosis. Epidemiology. Treatment and prevention
110. Mycobacteria. The most significant human pathogens. M.tuberulosis. General properties. Culture and isolation, identification. Determinants of pathogenicity. Pathogenesis and clinical disease of tuberculosis. Epidemiology. Laboratory diagnosis. Treatment. Control and prevention. Mycobacteria other than tuberculosis.
111. The genus Bacillus. Classification. Defining characteristics. B.anthracis. Determinants of pathogenicity. Anthrax. Pathogenesis and clinical disease. Epidemiology. Laboratory diagnosis. Treatment. Control and prevention.
112. The family Mycoplasmataccae. General characteristics. Classification. M.pneumoniae, M.hominis, Ureaplasma urealyticum. Pathogenesis and clinical disease of mycoplasmosis. Immunity. Epidemiology. Laboratory diagnosis. Treatment, prevention, and control.
113. Pathogenic Protozoa, their biological properties. Taxonomy of kingdom Protozoa. Classification. Role in pathology of man. Toxoplasma gondii. Morphological properties. Life-cycle. Epidemiology. Pathogenesis and clinical disease of toxoplasmosis. Laboratory diagnosis. Treatment, prevention, and control.
114. The family Vibrionaceae. Taxonomy, general properties. Classification. Vibrio cholerae 01 and 0139. Culture, biochemical characteristics, antigenic structure, determinants of pathogenicity, epidemiology. Pathogenesis and clinical disease of cholera. Laboratory diagnosis. Treatment, prevontion, and control. Vibrio parahaenolyticum. Vibrio vulnificus.
115. The family Enterobacteriaceae. Classification. The genus Klebsiella: K.pneumoniae, K.ozoenae, K. rhinoscleromatis. Taxonomy, general properties, structure, biochemical characteristics, antigenic structure, determinants of pathogenicity, epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment, prevention, and control.
116. The genus Yersinia. Y.pestis, Y.enterocelitica, Y.pseudotuberculosis. Taxonomy, general properties, resistance to physico-chemical factors, determinants of pathogenicity. Plague. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment, prevention, and control.
117. The genus Clostridium. Classification. C.tetani. Taxonomy, general properties, resistance to physico-chemical factors, determinants of pathogenicity, toxin production, transmission. Pathogenesis and immunity of tetanus. Epidemiology. Clinical syndromes: generalized, localized, and neonatal tetanus. Laboratory diagnosis. Treatment, prevention, and control.
118. The genus Francisella. F. tularensis. Taxonomy, general properties. Determinants of pathogenicity. Transmission. Clinical symptoms of tularemia. Laboratory diagnosis. Treatment, prevention, and control.
119. Anaerobic bacteria. General characteristics. Classification. Non-spore-forming Gram-positive cocci (Peptostreptococcus) and Gram-negative bacilli (Bacteroides, Prevotella, Fusobacterium). Epidemiology. Virulence factors. Pathogenesis. Clinical manifestations. Laboratory diagnosis. Treatment.
120. The genus Clostridium. Defining characteristics of Clostridium. Classification. Clostridia as the causative agents of wound anaerobic infections. C.perfringens: determinants of pathogenicity. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment and prevention.
121. The family Spirochaetaceae. General properties. Classification. The genus Borrelia. B.recurrentis. (Epidemic relapsing fever). B.burgdorferi. (Lyme disease). Determinants of pathogenicity, epidemiology, pathogenesis, and clinical disease. Laboratory diagnosis of epidemic relapsing fever and Lyme disease. Treatment, prevention, and control.
122. The genus Brucella. General properties. Classification. B.melitensis, B.abortus, B. suis. Pathogenicity . Pathogenesis and clinical symptoms of brucellosis. Epidemiology. Laboratory diagnosis. Treatment and prophylaxis.
123. The genus Clostridium. Main pathogenic clostridia and their association with human diseases. C.difficile. Virulence factors. C.difficile as the cause of pseudomembranous colitis. Laboratory diagnosis of C.difficile infection. Treatment. Modes of control.
124. The genus Bordetella. General proportie. Classification. B.pertussis. Determinants of pathogenicity. Pathogenesis and clinical symptoms of whooping cough. Epidemiology. Laboratory diagnosis. Therapy. Immunity and immunoprophylaxis.
125. Pathogenic Protozoa. General characteristics. Classification. Flagellates. Classification. Leishmania species. General properties. Epidemiology. Pathogenesis and clinical disease of cutaneous, mucocutaneous, visceral leishmaniasis. Laboratory diagnosis. Treatment, control and prevention.
126. The genus Corynebacterium. C. diphtheriae. Taxonomy, classification, general properties,resistance to physico-chemical factors, toxinproduction, transmission. Pathogenesis and clinical symptoms of diphtheiae. Laboratory diagnosis. Treatment and immunoprophylaxis.
127. The genus Clostridium. Taxonomy, classification, general characteristics. C. botulinum. Determinants of pathogenicity. Epidemiology. Pathogenesis and clinical symptoms of botulism. Laboratory diagnosis. Treament, prevention,and control.
128. The family Legionellaceae. Classification. L.pneumophila. General properties. Determinants of pathogenicity. Legionnaires΄ disease. Pontiac fever. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment.
129. The family Spirochaetaceae. Classification. The genus Treponema. T.pallidum. General properties. Determinants of pathogenicity. Syphilis. Pathogenesis and clinical disease. Epidemiology. Immunity. Laboratory diagnosis. Treatment.
130. Campylobacter and Helicobacter. General properties. Classification. Determinants of pathogenicity. Epidemiology. Gastroenteritis caused by C.jejuni. Gastritis, gastric peptic ulcers, and gastric carcinoma associated with H.pylori. Pathogenesis and clinical disease. Laboratory diagnosis. Noninvasive tests of urease activity. Treatment.
131. The family Rickettsiaceae. Classification. General characteristics. Rickettsiosis. Classification. Q fever. Epidemiology. Pathogenesis and clinical presentation. Laboratory diagnosis. Treatment and immunoprophylaxis.
132. Plasmodium species. Life cycle. Malaria. Epidemyology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment. Control and prevention.
133. Paramyxoviruses. Classification. General characteristics. Measles virus. Mumps virus. Parainfluenza virus. Respiratory syncytial virus. The genus Rubivirus. General characteristics. Epidemiology. Clinical disease. Laboratory diagnosis. Treatment. Prevention.
134. Adenoviruses. General characteristics: structure, serotypes. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment. Prevention.
135. Poxviruses. Classification. Sructure. Smallpox, cowpox, and monkeypox. Epidemiology, clinical disease. Laboratory diagnosis. Prevention. Declaration of the World Health Organization: the world «smallpox-free».
136. Retroviruses. Human Immunodeficiency viruses (HIV). General characteristics. Acquired Immune Deficiency Syndrome (AIDS). Epidemiology. Pathogenesis. Clinical stages of HIV infection. Laboratory Diagnosis. Treatment. Immunoprophylaxis.
137. Picornaviruses. Classification. General characteristics. Biological properties. Antigens. Role in human’s pathology. Coxsackieviruses. Echoviruses. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment. Prevention. Newer enteroviruses.
138. Rhabdoviruses. General properties. Rabies. Epidemiology. Pathogenesis and clinical disease. Treatment. Control and prevention.
139. Orthomyxoviruses. The influenza viruses. Structure. Classification. Pathogenesis and immunity of influenza virus infection. Nospesific and specific defense mechanisms of anti influenza immunity, Treatment, prevention, and control. Severe acute respiratory syndrome (SARS).
140. 3. Polioviruses. Classification. General characteristics. Poliomyelitis. Epidemiology. Pathogenesis. Immunity. Clinical disease. Laboratory diagnosis. Prevention.
141. Hepatitis viruses. Classification. Hepatitis B virus. General properties. Associated antigens. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis. Treatment. Prevention: passive and active immunization.
142. Arboviruses. Classification. Main families and genera of Arboviruses. General characteristics. Pathogenesis of arbovirus infections. Yellow fever. Dengue fever. Encephalitis. Viruses assoeiated with hemorrhagic fever. Filoviruses (the Marburg virus and the Ebola virus). Arenaviruses (the Lasse fever virus). General properties. Epidemiology. Pathogenesis and clinical diseases. Laboratory diagnosis. Control and prevention.
143. Herpesviruses. Classification. General characteristics. Herpes simplex virus. Varicella-Zoster virus. Epstein-Barr virus. Cytomegalovirus. Epidemiology. Pathogenesis and clinical syndromes of herpesvirus infections. Laboratory diagnosis. Treatment and immunoprophylaxis.
144. Hepatitis viruses. Classification. Hepatitis C virus (HCV), hepatitis D virus (HVD), hepatitis G virus (HGV) and other. Pathogenesis and clinical disease. Immunity. Laboratory diagnosis. Treatment and prevention.
145. Hepatitis viruses. Classification. Hepatitis A virus (HAV). Hepatitis E virus (HEV). General characteristics. Epidemiology. Pathogenesis and clinical disease. Laboratory diagnosis of hepatitis A and hepatitis E. Immunity. Treatment. Prevention.
146. Circoviridae. Classification. Hepatitis TT and SEN. Epidemiology. Pathogenesis. Clinical syndroms. Laboratory diagnosis. Treatment. Prevention.
147. The family Picornaviridae. Cardioviruses. Epidemiology. Pathogenesis. Clinical syndroms. Laboratory diagnosis. Treatment. Prevention.
148. The family Picornaviridae, Rhinoviruses. Epidemiology, Clinical syndroms. Laboratory diagnosis. Treatment. Prevention.
149. Oncogenic viruses. General principles of viral oncogenesis. Proviruses and oncogenes. Mechanism of malignant transformation. DNA tumor viruses. RNA tumor viruses. Identifying viral oncogenic behavior.
150. Prions and slow virus diseases (prion diseases). Structure of cellular and scrapie prion proteins. Resistance to physico-chemical factors. Functions of cellular prion protein. Pathogenic characteristics of scrapie prion protein. Model for proliferation of prions. Epidemiology, pathogenesis and clinical syndromes of prion diseases. Laboratory diagnosis. Treatment, prevention, and control.
151. Hospital (nosocomial) infection. Microbiology of hospital infections. Common types of hospital infections. Diagnosis and control of hospital infection.
152. Probiotics and eubiotics. Characteristics. Mechanism of action.
153. Modern methods of laboratory diagnosis of infectious diseases.
154. Bacterial communication and group behavior. Biofilms. Quorum sensing.
155. Clinical microbiology: specimen collection, transport, and processing. Identification of pathogens. Antibiotic sensitivity testing.
156. Bacteriology of water. Bacterial flora in water. Factors determining the kinds and number of bacteria in water. Coli-titre. Coli-index. Bacteriological examination. Virological examination. Examination for specific pathogens.
157. Bacteriology of milk. Type of bacteria in milk. Milk borne diseases. Bacteriological examination.
158. Bacteriology of air. Measurement of air contamination. Bacteriological examination of environmental dust.
159. Bacteriology of soil. . Type of bacteria in soil. Soil borne diseases. Bacteriological examination.
160. Ecology of microorganism. Microflora of air, water, soil. Methods of examination.
161. Sanitary microbiology. Goal, objectives, and methods of sanitary microbiology.

**Approved at the meeting of the Department of Microbiology, Virology and Immunology.**

**Protocol No. 16, dated September 18, 2015.**

**Head of Department of Microbiology,**

**Virology аnd Immunology, Professor,**

**M.D., D.Sci. (med.) V.V. Minukhin**

**THE LIST OF MICROSLIDES, PRACTICAL SKILLS AND TASKS FOR EXAM ON MICROBIOLOY, VIROLOGY AND IMMUNOLOGY**

1. Describe culture properties of colonies of microorganisms:
   1. Staphylococcus aureus and Staphylococcus epidermidis on MPA.
   2. Staphylococcus aureus on blood agar.
   3. Neisseria gonorrhoeae on blood agar,
   4. Neisseria gonorrhoeae on chocolate agar,
   5. Bacillus anthracis on MPA.
   6. Pseudomonas aeruginosa on MPA.
   7. Corynebacterium diphtheriae, colonies gravis and mitis.
   8. Mycobacterium tuberculosis on the Levenstain-Yensen medium.
2. Describe character of growth of bacteria on differential media and explain principles of their use:
   1. Staphylococcus aureus on yolk-salt agar.
   2. Escherichia coli on Endo agar.
   3. Salmonella on Endo agar.
   4. Hiss medium.
   5. Ressel medium.
   6. Kitt-Tarozzi medium.
3. Describe principles of culture of obligate anaerobes in anaerobic jar.
4. Interpret results of serological reactions, make conclusion:
   1. slide agglutination test,
   2. tube agglutination test,
   3. indirect hemagglutination test (IНАT),
   4. ring precipitation test,
   5. double immunodiffusion assay,
   6. complement fixation test (CFT),
   7. hemagglutination test (HAT),
   8. inhibition hemagglutination test (HAIT),
   9. ELISA,
   10. immunofluorescence.
5. Interpret results of tests and describe their principle:
   1. disk diffusion test,
   2. dilution test to detect susceptibility of bacteria to antibiotics,
   3. Е-test.
6. Describe morphology of bacteria and methods of staining:
   1. Mixture of Gram-positive and Gram-negative bacteria, Gram stain
   2. Staphylococcus aureus, Gram stain
   3. Streptococcus pyogenes in pure culture, Gram stain
   4. Streptococcus pyogenes in the blood, Gram stain
   5. Streptococcus pneumoniae in sputum, Gram stain
   6. Neisseria gonorrhoeae in pure culture, Gram stain
   7. Neisseria gonorrhoeae in urethral exudate, Gram stain
   8. Neisseria gonorrhoeae, IF
   9. Enterobacteria, Gram stain
   10. Vibrio cholerae, Loeffler stain
   11. Vibrio cholerae, Gram stain
   12. Vibrio cholerae, ІF
   13. Corynebacterium diphtheriae, Gram stain
   14. Corynebacterium diphtheriae, Neisser stain
   15. Corynebacterium diphtheriae, methylene blue stain
   16. Mycobacterium tuberculosis in sputum, Ziel-Neelsen stain
   17. мікроколонії Mycobacterium tuberculosis, Ziel-Neelsen stain
   18. Bacillus anthracis, central spore, Gram stain
   19. Bacillus anthracis, streptobacillus, Gram stain
   20. Capsule, methylene blue stain
   21. Capsule, Burri-Giens stain
   22. Yersinia pestis, Giemsa stain
   23. Clostridium tetani, Gram stain
   24. Clostridium botulinum, Gram stain
   25. Clostridium, spores, Gansen (Ozheshko) stain
   26. Clostridium perfringens, Gram stain
   27. Chlamydia trachomatis, Giemsa stain
   28. Treponema pallidum, Burri stain
   29. Treponema pallidum, ІF
   30. Leptospira interrogans, Morosov stain
   31. Borrelia recurentis in blood, Giemsa stain
   32. Rikettsia, Zdrodovsky stain
   33. Giardia lamblia, Giemsa stain
   34. Entamoeba hystolitica, ferraferrous hematoxiline stain
   35. Balantidium coli, ferraferrous hematoxiline stain
   36. Toxoplasma gondii, Giemsa stain
   37. Trichomonas vaginalis in pure culture, methylene blue stain
   38. Trichomonas vaginalis in the smear from vagina, methylene blue stain
   39. Leishmania spp., Giemsa stain
   40. Trypanosoma spp., Giemsa stain
   41. Plasmodium vivax, shizont, Giemsa stain
   42. Plasmodium vivax, trophozoite, Giemsa stain
   43. Plasmodium falciparum, ring stage, Giemsa stain
   44. Plasmodium falciparum, gametocyte, Giemsa stain
   45. Plasmodium malaria, trophozoite, Giemsa stain