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SYNOPSIS FOR THEORETICAL EXAMINATION OF MEDICAL MICROBIOLOGY AND VIROLOGY

1. The science of microbiology. Cellular and noncellular microorganisms. Prokaryotes and eukaryotes. Bacteria: general characteristics.
2. Morphology of bacteria. Bacterial structure. Ribosomes. Nucleoid. Cytoplasmic membrane.
3. Cell wall. Peptidoglycan. Teichoic acids. Special components of gram-negative cell wall.
4. Capsule and glycocalyx. Flagella. Pili. Endospores.
5. Classification of bacteria. Taxonomy. Approaches to taxonomy. Nomenclature.
6. Classification of medically important bacteria.
7. The growth of microorganisms.
8. Bacterial metabolism. Heterotrophic bacteria. Glucose dissimilation pathways. Respiration. Fermentation.
9. Aerobic and anaerobic bacteria. Biosynthetic pathways. Synthesis of peptidoglycan.
10. Microbial genetics. Genetic material in bacteria. Bacterial chromosome and plasmids. Bacteriophages. Transposons.
11. Bacterial mutations. Transfer of DNA between bacterial cells. Conjugation.
12. Transduction. Transformation.
13. Pathogenesis of bacterial infections. Virulence factors of bacteria; adherence and colonization factors; invasion factors; factors for escaping host defenses; toxin production.
14. Infection. Stages of a typical acute infectious disease. Types of bacterial infections. "Koch's postulates".
15. Host defenses. Nonspecific defenses. Physical barriers. Phagocytic cells. Proteins: the complement system, lysozyme, and interferons.
16. Nonspecific defenses. Skin and mucous membranes. Inflammatory response and phagocytosis.
17. Specific immunity. Active and passive acquired immunity. Immunogens, antigens, and epitopes. Cellular basis of the immune system.
18. Antibodies. Humoral immunity.
19. Cell mediated immunity. Antibacterial responses. Innate response. Antigen-specific responses.
20. Hypersensitivity. Immediate (anaphylactic) hypersensitivity. Cytotoxic hypersensitivity.
21. Immune-complex hypersensitivity. Delayed (cell-mediated) hypersensitivity.
22. Immunoprophylaxis and immunotherapy of infectious diseases.
23. Antimicrobial chemotherapy. Desired properties of antimicrobials. Mechanisms of action of antibacterial and antifungal drugs. Inhibitors of cell wall synthesis.
24. Beta-lactam antibiotics.
25. Inhibitors of protein synthesis.



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26. Inhibitors of nucleic acid synthesis.
27. Cell membrane inhibitors. Drugs with antibacterial and antifungal activity.
28. Resistance to antimicrobial drugs. Basic mechanisms of bacterial resistance. Genetic basis of resistance.
29. Antibiotic use. Factors for selection of antimicrobial drugs for therapy in individual patients. Antimicrobial combinations. Prophylaxis with antimicrobial agents.
30. Normal microbial flora of the human body.
31. Gram-positive cocci. Classification. Genus *Staphylococcus*. *S. aureus*. CNS.
32. Genus *Streptococcus*. *S. pyogenes*.
33. Genus *Streptococcus*. *S. agalactiae*. *Viridans streptococci*.
34. Genus *Streptococcus*. *S. pneumoniae*.
35. Genus *Enterococcus*.
36. Gram-negative cocci. Genus *Neisseria*. *N. gonorrhoeae*.
37. Genus *Neisseria*. *N. meningitidis*.
38. Family *Enterobacteriaceae*: general characteristics.
39. Genus *Escherichia*.
40. Genus *Shigella*.
41. Genus *Salmonella*.
42. *Klebsiella-Enterobacter-Serratia* group. *Proteus-Providencia-Morganella* group.
43. Genus *Yersinia*. *Y. enterocolitica*. *Y. pestis*.
44. Genus *Vibrio*. *V. cholerae*. *V. parahaemolyticus* and other vibrios.
45. Genus *Campylobacter*.
46. Genus *Helicobacter*. *H. pylori*.
47. Nonfermentative gram-negative bacilli. Genus *Pseudomonas*.
48. Genus *Burkholderia*. Genus *Stenotrophomonas*. Genus *Acinetobacter*. Genus *Moraxella*.
49. Genus *Haemophilus*.
50. Genus *Legionella*.
51. Genus *Bordetella*.
52. Genus *Brucella*.
53. Genus *Francisella*.
54. *Corynebacterium diphtheriae*.
55. Genus *Listeria*. *L. monocytogenes*.
56. Genus *Mycobacterium*. *M. tuberculosis*.
57. *Mycobacterium leprae*.
58. Atypical mycobacteria.
59. Actinomycetes. Genus *Actinomyces*.
60. Anaerobic non-spore-forming bacteria.
61. Aerobic spore-forming bacilli. Genus *Bacillus*. *B. anthracis*. *B. cereus*.
62. Anaerobic spore-forming bacilli. *C. difficile* and related organisms.
63. Genus *Clostridium*. *C. tetani*.



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64. Genus *Clostridium*. *C. botulinum*.
65. *Spirochetes*. Genus *Treponema*. *T. pallidum*.
66. Genus *Borrelia*. *B. recurrentis*. *B. burgdorferi*.
67. Genus *Leptospira*.
68. Genus *Mycoplasma*. Genus *Ureaplasma*.
69. Chlamydiaceae. Genus *Chlamydia*. Genus *Chlamydophila*.
70. Genus *Rickettsia*. Genus *Coxiella*.
71. Fungi: general characteristics. Fungi causing. Superficial, cutaneous, subcutaneous and deep mycoses.
72. Fungi causing opportunistic mukoses. Opportunistic mycoses.
73. General properties of viruses.
74. Classification of medically important viruses.
75. Pathogenesis of viral infections. Non-specific and specific host defenses against viruses.
76. Antiviral drugs. Interferons. Viral vaccines.
77. Adenoviruses.
78. Herpesviruses. Human herpesvirus 1,2.
79. Varicella-zoster virus.
80. Cytomegalovirus.
81. Epstein-Barr virus.
82. Poxviruses. Virus variolae.
83. Hepatitis viruses.
84. Human papillomavirus (HPV).
85. Human polioviruses.
86. Human coxsackieviruses.
87. Human echoviruses.
88. Ortomyxoviruses. Influenza virus.
89. Paramyxoviruses. Mumps virus.
90. Measles virus.
91. Rotaviruses.
92. Arboviruses. General characteristics. Classification. Haemorrhagic fevers. Viruses causing.
93. Rubella virus.
94. Rabies virus.
95. Retroviridae. HIV-1 и HIV-2.
96. Unconventional slow viruses: prions.
97. Laboratory diagnosis of viral diseases.
98. Laboratory diagnosis of viral infections of the respiratory tract.
99. Laboratory diagnosis of viral infections of the gastrointestinal tract, liver, central nervous system, and skin.

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100. Laboratory diagnosis of sexually transmitted viral infections; prenatal, neonatal and postnatal viral infections; oncogenic viral infections; and viral infections transmitted by arthropods.
101. Laboratory diagnosis of bacterial infections of the central nervous system.
102. Laboratory diagnosis of bloodstream infections.
103. Laboratory diagnosis of bacterial infections of the respiratory tract.
104. Laboratory diagnosis of bacterial infections of the genitourinary system.
105. Laboratory diagnosis of bacterial infections of the gastrointestinal tract.
106. Laboratory diagnosis of wound infections.


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1. Microscopic observation of bacteria in unstained conditions.
2. Microscopic observation of bacteria in stained preparations: Loeffler's methylene blue and Gram stain.
3. Microscopic observation of bacteria in stained preparations: Acid-fast stain (Ziehl-Neelsen stain) and staining procedures for spores.
4. Cultivation and isolation of bacteria in vitro. Culture media. Methods for aerobic and anaerobic cultivation.
5. Conventional methods for biochemical identification of bacteria.
6. Rapid biochemical tests for identification of bacteria.
7. Immunological methods for diagnosis of infectious diseases. Diagnostic agglutination reactions.
8. Immunological methods for diagnosis of infectious diseases. Immunologic reactions with labeled antibodies or antigens.
9. Genetical methods for diagnosis of infectious diseases.
10. Methods for testing antimicrobial susceptibility. Bacterial broth dilution method.
11. Methods for testing antimicrobial susceptibility. Bacterial disk diffusion method.
12. Sterilization and disinfection.
13. Microbiological diagnosis of infections due to *staphylococci*.
14. Microbiological diagnosis of infections due to *β-hemolytic streptococci*.
15. Microbiological diagnosis of infections due to *S. pneumoniae*.
16. Microbiological diagnosis of infections due to *viridans streptococci* and *enterococci*.
17. Microbiological diagnosis of anthrax.
18. Microbiological diagnosis of diphtheria.
19. Microbiological diagnosis of listeriosis.
20. Microbiological diagnosis of whooping cough.
21. Microbiological diagnosis of infections due to *N. meningitidis*.
22. Microbiological diagnosis of infections due to *N. gonorrhoeae*.

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23. Microbiological diagnosis of infections due to *H. Influenzae*.
24. Microbiological diagnosis of shigellosis.
25. Microbiological diagnosis of typhoid fever.
26. Microbiological diagnosis of enterocolitis due to *Salmonella spp.*
27. Microbiological diagnosis of infections due to *E. coli*.
28. Microbiological diagnosis of infections due to *Klebsiella, Enterobacter, Serratia* group.
29. Microbiological diagnosis of infections due to *Proteus, Providentia, Morganella* group.
30. Microbiological diagnosis of cholera.
31. Microbiological diagnosis of infections due to *P. aeruginosa*.
32. Microbiological diagnosis of infections due to *C. perfringens*.
33. Microbiological diagnosis of tuberculosis.
34. Microbiological diagnosis of infections due to *Candida*.
35. Laboratory diagnosis of viral infections.
36. Laboratory diagnosis of central nervous system infections.
37. Laboratory diagnosis of bloodstream infections.
38. Laboratory diagnosis of respiratory tract infections.
39. Laboratory diagnosis of urinary tract infections.
40. Laboratory diagnosis of sexually transmitted infections.
41. Laboratory diagnosis of gastrointestinal tract infections.
42. Laboratory diagnosis of wound infections.



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