The number of the situational problem in the list corresponds to the number of the questions from the list of questions for preparing for the exam. In a situational task on a specific agent during the exam there will be 20 questions.

These issues include the taxonomic position, the antigenic structure of the pathogen; features of epidemiology (source of infection, route of transmission); microbiological features of the pathogenesis of the disease; principles of diagnosis of the disease (including serological markers of different stages of the disease; principles of cultivation and identification of the pathogen; principles of formulation and interpretation of serological reactions, which can be used in the diagnosis); principles of prophylaxis and therapy (including methods of administering treatment-and-prophylactic drugs, their composition, terms of administration and features of the formation of immunity).

Section 3 - Special Bacteriology

1. The patient has continued fever. Blood was taken for sterility investigation in bacteriological laboratory. Gram + large cocci located in clusters were found in the colonies. Plasma-coagulation reaction is positive. The doctor preliminarily diagnosed staphylococcal sepsis.

2.1. Gram-positive lancet form diplococci with the pointed opposite ends were revealed in the sputum of a patient suspected of pneumonia. What species of bacteria is it?

2.2. In the material of the patient with the suspicion of scarlatina Gram-positive oval-shaped microorganisms arranged in chains were revealed. What are the basic cultural properties of the causative agent of scarlatina?

3. For the confirmation of the anaerobic bacteria origin of infection in the patient, 10 ml of pus from the wound was taken and grown in a special media - Anaerobic blood agar. The crop was cultivated in an aerostat at a t = 37 °C for 3 days. After 3 days signs of growth appeared: colonies vary from raised, dull, smooth, non-hemolytic to convex and dull. Often colonies display a slightly yellow pigment. Microscopy of the preparation from the colonies revealed Gram-positive cocci located in pairs, tetrads, clumps, and chains. According to the results of the initial examination of the patient and the 1st stage of the bacteriological method, the doctor suspected Pepto-streptococcal etiology of the disease.

4. A child is hospitalized with the symptoms of headache, vomiting and slurred speech. Lumbar puncture was made and Gram-negative diplococci located mainly intracellularly were revealed. What is the cause of this case? (meningitides)

5. During bacteriological investigation of pyogenic discharge from urethra there were discovered Gram negative coffee-bean shaped bacteria which could ferment glucose into acid and were settled inside cytoplasm of leucocytes. What disease can these microorganisms cause? (gonorrhea)

6. A 7-year-old boy has cholera-like disease (vomiting, profuse diarrhea). On plating the patient’s feces in an Endo agar, similar colonies of crimson color with metallic sheen appeared. What organism is likely to be the agent of the disease? (Escherichia)

7. During the post-mortem examination of a 56-year-old male, several ulcers in diameter of 4-5 cm were found in the terminal portion of small intestine. The edges of the ulcers were above the mucous membrane, the walls were covered with grey-yellowish friable mass. Widal test appeared to be positive. What was the patient diagnosed with? (Typhoid fever).

8. Bacteriological investigation of the patient’s vomiting discharge and stomach washing water revealed mobile Gram-negative bacilli of medium size with rounded ends which agglutinate with Salmonellosis O-serum of group B. Identical microorganisms were also detected in meat salad that had been eaten by the patients. The agent of what disease is described in this particular case? (salmonellosis gastroenteritis).

9. A 29-year-old patient presented with vomiting, severe diarrhea, and tenesmus. Feces are decolorized with bundles of mucus and streaks of blood. During bacteriological investigation of the colonies on MacConkey agar immobile Gram-negative bacilli were revealed. They decomposed lactose partially within 48 hours. What is the causative agent of this infectious process? (shigellosis).
10. An 8-month-old child suffered from intestinal disturbances. Qualitative and quantitative analysis of intestinal micro flora suggested the diagnosis of klebsielllosis dysbacteriosis. What is the mechanism of this bacteria effect?

11.1. Patient C., 28 years old, presented with acute colitis and signs of moderate intoxication and diarrhoea. Feces contained blood streaks. Catalase positive and Gram-negative microaerophilic bacteria were isolated through bacteriological investigation. They didn't grow at 25 °C, were urease-negative; when two cells were taken together they looked like "sea-gull wing", didn’t produce spores and capsules, were mobile. What bacteria are they likely to be? (Campylobacteria).

11.2. A patient is diagnosed with gastric ulcer. On the 5th day of bacteriological study of biopsy obtained from the damaged part of the stomach, small colonies of Gram-negative oxidised-positive spiral bacteria grew on chocolate agar. Which of the microorganisms is most likely to cause stomach ulcers? (Helicobacter pylori).

12. In one of the sea ports, 30 cases of acute intestinal infection followed by profuse diarrhea, vomiting, and severe dehydration were registered. Fecal discharge looked like "rice water stool". What disease is it likely to be? (cholera).

13. Puncture of the lymphatic node was delivered to the bacteriological laboratory. Bacteriologist inoculated material in a nutrient agar. It was cultivated in a thermostat at a temperature of 37 °C and of 28 °C. The most intense growth of the culture was observed at t = 28 °C. What microorganism is likely to be identified by bacteriologist? (Yersinia pestis).

14. A man of 30 years old is diagnosed with a case of classical gastrointestinal symptoms. It is established that the pathogen isolated from the patient is an invasive, intracellular pathogen, capable of growth within macrophages. What is the most likely causative agent of the disease? (Y. pseudotuberculosis).

15. A patient complaining of symptoms typical for tularemia is admitted to the hospital. What method is suggestive in this case for express diagnostics of the disease? (tularemia)

16. A worker of meat processing factory developed arthritis accompanied by inflammation of peripheral lymphatic nodes, pain, high temperature, and symptoms of allergy. The causative agent was not identified during laboratory investigation, but skin allergi c Burnet’s test appeared to be positive. What microorganism could have caused the disease? (brucellosis).

17. Sputum of the patient with severe acute pneumonia was bacterioscopically investigated. Gram staining revealed Gram-positive streptobacilli with cut endings. What species of bacteria was identified by bacteriologist? (Bacillus anthracis).

18. While investigating the sterility of the dressings, bacteriologist revealed mobile Gram-positive rods with rounded spores located terminally in a shape of drum sticks. Bacterium was anaerobe. Which anaerobic bacterium is characterized by such properties? (tetanus).

19. A 35-year-old patient is complaining of progressive muscular weakness, slight deterioration, seeing objects doubled, "net" in front of the eyes, difficulty in swallowing food and thirst. 24 hours earlier, he was known to have drank alcohol and ate tinned mushrooms. What preliminary diagnosis is it likely to be? (botulism)

20. Bacteriologist investigated pieces of tissue and discharge from the wound of a surgical patient. The injury had not healed for a long time and it was characterized by swollen tissues and formation of gas. What diseases are caused by Gram-positive allocated rods? (wound gas anaerobic infection).

21. Bacteriological examination of pus obtained from post-operativeal wound identified pathogen which grew up on sugar-blood agar and created S-shaped black pigmented shining colonies of unpleasant odor within 7-10 days of anaerobic conditions. Microscopy of the specimen revealed Gram-negative rods with extensive polymorphism. What microorganism caused suppuration? (Bacteroides spp.)

22. Examining the patient, ETS specialist noted hyperemia and swelling of the tonsils covered with yellow-grayish coat. Microscopy of the swab revealed Gram-positive rods arranged angular to each other. What is the initial diagnosis of the disease? (diphtheria).
23. A patient had been burning with fever for ten days. A physician noted attacks of typical spasmodic cough and administered inoculation of pharyngeal sputum in casein-charcoal agar. What microorganism is suggested to be identified in the sputum? (whooping cough).

24. Bright red bacilli located separately or in settlers and resistant to acids were identified in micropreparations made of the sputum and stained by Zeihl-Neelsen method. Pathological material created "serpentine cords" and grew slowly on cultural medium. First signs of their growth appeared in 10-15 days. Microorganisms did not produce spores and capsules. What species do the microorganisms belong to? (tuberculosis).

25. A student visited a dermatovenerologist complaining of erosion on penis which had appeared some days before. Examination of the patient determined painless ulcer of 10 μm in diameter with distinct and flat edges. Regional lymphatic nodes were enlarged; the patient’s condition was satisfactory. Microscopy of the material taken from the ulcer revealed weaved mobile decolorized microorganisms. Choose the most likely agent of the disease. (syphilis).

26. A patient presented to the clinic with intoxication and renal failure. Micropreparation from the urine stained by Romanovsky-Giemsa revealed mobile pink microorganisms with numerous small curves. Case history reported that the patient had swum in the open water a few days before. What disease is likely to be diagnosed? (leptospirosis).

27. A patient is observed with recurrent attacks of fever. A specimen of patient’s blood was introduced subcutaneously to a guinea pig. 5 days later microscopy of the sick animal’s blood intensely stained by Romanovsky-Giemsa method revealed spirochetes with 6-8 uneven twists. The causative agent of what disease was identified? (endemic relapsing fever).

28. A 3-year-old child was diagnosed with interstitial pneumonia, which did not respond to antibiotics affecting bacteria of the cell wall. On the basis of clinical laboratory findings, what diagnosis can be made for the child? (Mycoplasmal pneumonia).

29. A 67-year-old man complaining of headache, fever, and general weakness was admitted to the hospital. On physical examination, a physician revealed scanty rash on lateral surfaces of the body, enlarged spleen. At the age of 35 the patient was attacked by typhus. Findings of serological investigation: reaction of agglutination with Rickettsia Prowazekii was positive (titer 1:160), reaction of agglutination with Proteus OH19 was negative. What disease was the patient diagnosed with? (Brill-Zinsser disease).

30. A patient who works as a farmer has the following symptoms: a high fever, chills or sweats, a cough chest pain while breathing, a headache, clay-colored stools, diarrhea, muscle pain, shortness of breath, rash. Bacteriological examination identified Coxiella Burnette. What disease can be diagnosed in this patient? (Q-fever).

31. A bacterium is isolated from the patient’s material (sputum), which thrives well in soil and water, bacteria can multiply in all kinds of water systems — hot tubs, air conditioners and mist sprayers in grocery store produce departments. The doctor made a preliminary diagnosis of Legionnaires’ disease. What microorganism causes this disease?

34. Bacteriological diagnosis revealed subgingival Veillonella isolates in the vaginal mucosa of the patient diagnosed with nonspecific vaginitis. Specify the microbiological features of the pathogenesis of the disease caused by this microorganism.

36. A 35-year-old woman with a gynecological examination revealed the following symptoms: vaginal discharge that is greyish in color and has a foul, fishy odor. The doctor made a preliminary diagnosis of Bacterial Vaginosis (BV) as the infection. What microorganism causes this disease? (Gardnerella vaginalis)

37.1. Investigation of the blood specimen obtained from the patient with pulmonary disease confirmed a preliminary diagnosis of psittacosis. What is the most likely source of infection?

37.2. Microscopy of a vaginal smear revealed cells with cytoplasmic inclusions. Preliminary diagnosis is chlamydiosis. What serological method seems to confirm the diagnosis?
41. The course of treatment by antibiotics resulted in the development of stomatitis. A swab from the mucous membrane of the oral cavity yields oval polymorphic microorganisms of deep purple pigmentation arranged in settlers. What microorganism is likely to cause the disease? (Candida spp).

42.1. An 8-year-old boy is diagnosed with alopecia. The hair on the head is cut 5-8 µm above the surface of the head; the roots are covered with mosaic arranged arthroconidia (like "ectothrix"). Fluorescent microscopy of the damaged hair yields green lightning. Which of pathogenic fungi is likely to cause the disease? (Microsporum spp).

42.2. Lesions of the damaged skin and hair were revealed on the patient’s head: the hair had been cracked above the surface of the skin, also, it was damaged in hair follicles. Microscopy of the hair revealed that microorganisms looked like "endothrix" − arthroconidia are identical, large, oval, located in the middle of the hair root like long chains. Name the causative agent of the disease. (Trichophyton violaceus).

42.3. Microscopy of the hair from the patient’s damaged lesions revealed mycelium of fungi, spores, air blisters, and oil drops. What causative agent of fungale disease is characterized by such clinical features? (favus).

42.4. Microscopy of epidermis of digital folds and soles revealed septic branchy mycelium and square arthrospores located in chains. What agent of mycosis are these morphological particularities typical for? (epidermophytia).

43. A resident of the village presented with a solid phlegm-like infiltrate in the cervical-jaw portion; the skin around it was of blue-purple pigmentation. In the center there was necrotizing purulent infiltrate with unpleasant odour. To confirm the diagnosis of actinomycosis, microscopy of the pus was performed. What microorganism is likely to be identified to confirm the diagnosis? (Drooozes).

44. Principles of sanitary-microbiological study of food products and interpreting the results.


Section 4- Special virology and clinical microbiology.

1. Young man was hospitalizing with symptoms of acute respiratory illness in the Infectious Diseases Hospital. According to the anamnesis and clinical data doctor made a preliminary diagnosis of influenza in patient.

2. The child complains of sharp dry ("barking") cough, runny nose and fever. The doctor put a preliminary diagnosis of "parainfluenza infection".

3. The results of viral monolayer cell microscopy, which had been infected with material from the patient, was diagnosed as "respiratory syncytial (RS) virus infection".

4. The 3-year-old girl had not had any immunizations because her mother had refused to have her vaccinated. She had no significant illnesses until the last 4 or 5 days, when she had an unrelenting fever of 102°F to 104°F, a “dry/heavy” cough, red eyes, and congestion. The girl had rubeola, or measles.

5. According to the anamnesis and clinical data of a patient showing symptoms of acute respiratory disease, the patient was diagnosed with epidemic parotitis or mumps.
6. Pregnant woman (2 months pregnancy) became sick: body temperature increased up to 38,5 °C, severe headache, neck muscles’ ache, skin rash and lymphatic nodes increased. Doctor diagnosed her with "rubella".

7. In a sick child, doctor diagnosed inflammation of the sublingual and submandibular salivary glands. What pathological material is necessary to be taken from the patient to confirm the diagnosis of epidemic parotitis?

8. For several days in a kindergarten 5 children were sick. Children were hospitalized with a diagnosis of polio?

9. A child was hospitalized at infectious hospital with a diagnosis of "enterovirus infection?". Virologist used cell culture monkey (Vero) and suckling mice for the accumulation of viruses. Virology did not reveal cytopathic effect in cell culture, but registered the death of suckling mice. The doctor suspected Coxsackie viral infection.

10. Child with clinical signs of a cough, sore throat, rash and flu like symptoms was diagnosed with "ECHO-virus Infection".

11. Child (6 yrs.) was hospitalizing with symptoms of infection of the sinuses (openings in the bone near the nose and eyes). According to the anamnesis and clinical data doctor made a preliminary diagnosis of Rhinoviruses infection in patient.

12. Young man was admitted in an Infectious Diseases Hospital with symptoms of acute fever up to 40°C, abundant polymorphic roseolar–petechial rashes (with localization in the extremities, chest, and abdomen), chills, and weakness. According to the anamnesis and clinical data doctor made a preliminary diagnosis of Cardioviral infection in patient.

13. In young children, a certain disease began with fever and vomiting, followed by diarrhea. Children lost interest in eating and drinking and became dehydrated from the loss of fluids. According to the anamnesis and clinical data doctor made a preliminary diagnosis of "rotaviral gastroenteritis" in children.

14. After accident in the water-supply system, acute enteric infection level was registered among population. According to the epidemiologic situation, all hospitalized patients of inflectional section were diagnosed with Hepatitis A.

15. The child was hospitalized in hospital with a viral upper respiratory tract infection. Viruses of which of the family are "doubleacting viruses": i.e. are both oncogenic viruses and can cause an infectious disease?

16. A 56 years old man developed symptoms of upper-respiratory infection: including runny nose, coughing, sore throat, and sometimes a fever. Doctor suspected coronavirus etiology of the disease.

17. After a clinical and laboratory examination of a patient with relapsing opportunistic infections, the doctor diagnosed HIV in the patient.

18. Blood serum examination of a patient with signs of immunodeficiency has shown myelopathy. Which disease is confirmed by this result?

19. Patient complains on jaundice, subfebril temperature. Three months ago, the patient indulged in intravenous manipulations. The doctor made a preliminary diagnosis of viral hepatitis B.

20. Surgical operation of blood transfusion was made. The blood must be checked to find antigens of some disease. What disease is expected to be found?

21. In connection with complicated course of hepatitis B the doctor ordered an examination to detect the satellite, which complicated the course of the underlying disease. What agent is this?

22. In the blood of a patient the doctor used PCR to reveal the DNA Circoviridae. In what disease (hepatitis) are these antigens detected?

23. The patient is found out to have elevated body temperature, mucous membrane of the cheeks is reddened and swollen with small painful vesicles. The doctor diagnosed acute herpes.

24. A female (28 yrs.) complaining of cold sore-like blisters in the genital area. Antibiotic ointment treatment was ineffective. The agent of this disease can be as follows?
25. A patient seeking help from a doctor on the second day of illness complained of vesicle eruption along the strike of 4 th -5 th intercostal spaces, vesicles are painful. He underwent chickenpox in his childhood. What diagnosis is likely to be made for the patient?

26. Having been transplanted with a kidney the patient got a proper treatment to prevent the re-infection of the kidney, but he developed the symptoms of generalized cytomegaloviral infection. What is the cause of the disease?

27. A 3-year-old child has continuous fever, lymph nodes are enlarged, the number of lymphocytes in blood is significantly increased. Enzyme Linked Immunosorbent Assay (ELISA) revealed antigen of Epstein-Barr virus. What diagnosis can be made based on the information given above?

28. In a patient N. experienced high fever, jaundice, and abdominal pain with vomiting and deteriorating kidney function, bleeding occurs from the mouth, nose, eyes. The doctor put a preliminary diagnosis of "yellow fever".

29. A patient was hospitalized to the infectious department with the signs of fever, sleepiness and meningeal symptoms. Anamnesis says that 2 weeks ago the patient drank raw goat milk. The preliminary diagnosis knows "tick-borne encephalitis".

30. In a patient N, a sudden development of fever, myalgia, dizziness, neck pain and stiffness, backache, headache, photophobia, nausea, vomiting, and diarrhea. From the anamnesis, it became known that the patient was bitten by a tick and traveled to countries in Asia. The doctor put a preliminary diagnosis of "Crimean-Congo hemorrhagic fever".

31. In a patient N, it is revealed the clinical symptoms is primarily characterized by fever, circulatory collapse with hypotension, hemorrhage, and acute kidney injury. Serum test results, such as the detection of IgM antibodies against hantavirus – positive. The doctor put a preliminary diagnosis of "hemorrhagic fever with renal syndrome (HFRS)".

32. A 40-year-old man was bitten by a fox. After 4 weeks, the patient developed fever, developed depression, lethargy, respiratory disorders and swallowing. After 6 days, the patient died from cardioplegia. Virologist found Negri-bodies imprints preparations from the section of brain of the deceased. Which family does the virus which caused the death of the patient belong to?

33. Virologist prepared smear-imprint of the cornea of an eye. Micro-preparation was stained by the Romanowsky-Giems method. During microscopy in the cytoplasm of cells virologist found the Guarneri bodies of various sizes and shapes. Which family owns a virus which causes formation of Guarneri body?

34. A 50-year-old man who returned from a business trip to Nigeria 24 days ago presents with complaints of the sudden onset of fever, diarrhea, myalgia, and headache. He reports 10 bowel movements per day and has seen bloody stools. He had no exposure to animals, mosquitoes, ticks, no sexual activity. When talking the man said "I was in close contact with an Ebola infected person". He felt well for the first 3 weeks.

35. A person suffers the following symptoms: headache, vomits blood, has joint and muscle pains, bleeds through the body openings, i.e. eyes, nose, gums, ears, anus and has reduced urine. Around the fifth day after the onset of symptoms, a maculopapular rash (most prominent on the chest, back, stomach) appeared. According to clinical symptoms, history and laboratory tests, the doctor diagnosed Marburg disease.

36. A 43-year-old man, 3 weeks after a trip to Liberia, developed severe symptoms of the disease: include hemorrhage, respiratory distress, severe vomiting, facial swelling, pain in the chest, back, and abdomen and shock. He was diagnosed with viruses causing hemorrhagic fevers and detected IgM against virus family Arenaviridae. What virus could have caused these symptoms?

37. After a bite by Aedes mosquito, a 34-year-old woman (after 10 days) developed the following clinical symptoms: mild and include low grade fever (37.8°C/100°F to 38.5°C/101.3°F), rash, joint pain (commonly in the hands and feet), red eyes (conjunctivitis), muscle pain, headache, pain behind the eyes, and weakness. The doctor suspected Zika virus infection and hospitalized the patient.

38. Oncogenic viruses. This question may include situational tasks on infectious mononucleosis, T-cell leukemia, B-cell lymphotrophic polyomavirus.

39. Papovaviridae. Papovaviruses are divided into two genera, Polyomavirus and Papillomavirus, on the basis of physicochemical and biologic properties. On this question, tasks on the structure, epidemiology,
laboratory diagnosis of diseases that cause these viruses will be included. For example, papillomatous lesions of skin and mucous membranes (common warts, plantar warts, flat warts, anogenital warts, epidermodysplasia verruciformis, and laryngeal papilloma), cervical intraepithelial neoplasia and cervical cancer are associated with human papillomavirus infection and progressive multifocal leukoencephalopathy.

40. It was established in a pregnant woman variable and diffuse clinical presentations: fever, malaise and uncommonly postinfectious arthralgia and arthritis-like symptoms may be present, 'Chronic anemia’. On the recommendation of the doctor, serological tests were performed to identify serological markers of Human parvovirus B19. What serological markers can confirm this infection?

41. A 60-year-old man has developed a form of progressive dementia with ataxia and drowsiness that allowed a physician to presumptively diagnose "Creutzfeldt-Jakob" disease. What pathogen causes the disease?

42. Slow infections. This question may include situational tasks on HIV-infection, measles, hepatitis B, hepatitis C, and rabies may be included.

43. Oncogenic viruses. This question may include situational tasks on papillomaviruses, genital herpes, Kaposi's sarcoma, hepatitis B, hepatitis C, polyomavirus infection, infectious mononucleosis, T-cell leukemia.

44. Nosocomial Infections:

44.1. Investigation of low-quality food stuff revealed mobile, Gram-negative bacilli with vertiginous growth in a shape of coal dust on MPA after 18 hours of cultivation. Isolates didn’t ferment lactose, but fermented glucose, maltose and sucrose producing acid and gas, hydrogen sulphide. What genus are the identified bacteria representatives of? (Proteus spp.).

44.2. When the material from the burns wound was plated on meat-peptone agar, colonies of medium and small size with irregular margin, blue-greenish pigmentation and metallic sheen grew up. The culture produced odour typical for jasmine. What species of bacteria was identified due to its cultural properties? (Pseudomonas aeruginosa).

44.3. Material obtained from the patient with maxillofacial injury and suppurative wound caused by Klebsiella pneumoniae was sent to bacteriological laboratory. What method of microbiological diagnostics was used to identify the cause of the disease?

44.5. Episode of enteric infection was registered in the therapeutic department. It was associated with the contaminated food that the patients had been fed with. It was hard to fight against the infection by antibiotic therapy. What causative agent of hospital infection was likely to cause the disease? (Salmonella).

44.6. A patient is diagnosed with gastric ulcer. On the 5th day of bacteriological study of biopsy obtained from the damaged part of the stomach revealed small colonies of Gram-negative oxidised-positive spiral bacteria grew on chocolate agar. Which of the microorganisms is most likely to cause stomach ulcers? (Helicobacter pylori).

44.7. Bacteriological study of the urine revealed Escherichia coli, the number of which calculated $10^6$ CFU/ml. What is it evident of? (Ascending infection of the urinary apparatus (pyelonephritis)).