1. Elevated levels of ketone bodies were detected in the blood of a patient with diabetes mellitus. Ketone bodies are synthesized from the following compound:

a. Succinate
b. Lactate
c. Glucose
d. Malate
e. Acetyl-CoA

2. Яким методом здійснюють кількісне визначення вісмуту в препараті?

a. Аргентометрії
b. Перманганатометрії
c. Меркуриметрії
d. Комплексонометрії
e. Йодометрії

3. In order to carry out the silver cations identification, HCl was added to the solution. Later, the formed solution was followed by adding the solution of ammonia. Specify which of the below-mentioned compounds are formed in such case?

a. $[Ag(NH_3)_3]Cl$
b. $[Ag_2(NH_3)_3]Cl$
c. AgOH
d. $[Ag(NH_3)_2]Cl$
e. $AgCl$

4. Coumarins, vitamin K antagonists, suppress the processes of blood coagulation. Synthesis of what protein is blocked by coumarins?

a. Transferrin
b. Ceruloplasmin
c. Prothrombin
d. Gamma globulin
e. Albumin

5. After the examination, the patient was diagnosed with typhus. What is the route of transmission of this disease?

a. Parenteral transmission
b. Airborne droplet transmission
c. Vertical transmission
d. Fecal-oral transmission
e. Vector-borne transmission

6. Від якого показника залежть коагулююча здатність електроліту?

a. Концентрації електроліту
b. Густини золю
c. Заряду іона-коагулятора
d. Об’єму золю
e. Ступеня дисперсності золю

7. What reaction occurs according to the free-radical (SR) mechanism?

a. $CH_2=CH_2+Cl_2$
b. $C_2H_6+Cl_2$
c. $C_6H_6+Cl_2$
d. $CH_3–CH_3+O_2$
e. $CH_3CH_2OH+HCl$

8. Water samples were received by a bacteriological laboratory for determining their coli index. What is the coli index?

a. Number of enterococci in 1 liter of water
b. Number of staphylococci in 1 liter of water
c. Number of Escherichia coli in 1 liter of water

d. Number of coliphages in 1 liter of water
e. Number of pseudomonads in 1 liter of water

9. A patient with Cushing syndrome has persistent hyper- \\ glycemia and glucosuria. In this case, increased synthesis and secretion of a certain hormone can be observed. What hormone is it?
a. Cortisol
b. Insulin
c. Glucagon
d. Adrenaline
e. Thyroxine

10. To stop a fever, the patient was prescribed a centrally acting non-narcotic analgesic that, unlike the other drugs in this group, has relatively weak anti-inflammatory effect. What drug is it?
a. Aspirin
b. Nurofen (Ibuprofen)
c. Indomethacin
d. Paracetamol
e. Analgin (Metamizole)

11. A patient complains of loss of appetite, weight loss, weakness, and abdominal pain. Laboratory blood test shows the following: Hb --- 90 g/L; erythrocytes --- $2.0 · 10^{12$/L; color index --- 1.4. B_{12} deficiency anemia has been diagnosed. What substance is deficient in this patient, causing the anemia?
a. Pepsin
b. Hydrochloric acid
c. Castle factor
d. Secretin
e. Renin

12. A patient demonstrates symmetrical dermatitis on the palms. A doctor made a diagnosis of pellagra. What vitamin deficiency can result in such symptoms?
a. Folic acid
b. Cobalamin
c. Ascorbic acid
d. Cholecalciferol
e. Nicotinic acid

13. The patient, who suffers from rheumatoid arthritis and concomitant duodenal ulcer should be prescribed a non-steroidal anti-inflammatory drug. What drug is most suitable in this case?
a. Paracetamol
b. Celecoxib
c. Metamizole
d. Diclofenac sodium
e. Acetylsalicylic acid

14. Under conditions of prolonged intoxication, a significant decrease in the activity of aminoacyl-tRNA synthetases can be observed. What metabolic process is disrupted in this case?
a. Genetic recombination
b. DNA replication
c. RNA processing
d. Protein biosynthesis
e. DNA repair

15. A dissected flower has numerous stamens that are united by the stamen filaments into several bundles. What is this type of androecium?
a. Monadelphous
b. Tetradynamous
c. Diadelphous
d. Polyadelphous

e. Didynamous

16. How many stereoisomeric aldohexoses exist?
a. 2
b. 16
c. 8
d. 4
e. 6

17. Cosmetic cream against mimic wrinkles contains "vitamin Q10" --- ubiquinone. What is the metabolic role of this vitamin-like substance?
a. It regulates water-salt exchange
b. It is a component of the mitochondrial respiratory chain
c. It decreases permeability of cell membranes
d. It regulates differentiation of epithelial cells
e. It stimulates collagen synthesis

18. What substance is used as an indicator in the back titration of an aqueous solution of acetic acid?
a. Diphenylcarbazone
b. Phenolphthalein
c. Eriochrome black T
d. Murexide
e. Diphenylamine

19. A patient with gout has been prescribed allopurinol. What is the mechanism of action of this drug?
a. Stimulation of uric acid breakdown
b. Inhibition of COX-2 enzyme
c. Inhibition of xanthine oxidase enzyme, inhibition of uric acid synthesis
d. Intensification of uric acid excretion by the kidneys
e. Activation of microsomal oxidation in the liver

20. The presence of antibodies to HIV has been established in the analyzed serum by means of enzyme-linked immunosorbent assay. What method or reaction must be used to confirm the diagnosis of AIDS?
a. Virological method
b. Bacteriological method
c. Immunofluorescence
d. Immunoblotting
e. Biological method

21. What type of cardiac arrhythmia occurs as a result of simultaneous disruption of excitability and conduction functions?
a. Sinus tachycardia
b. Respiratory arrhythmia
c. Atrioventricular block
d. Extrasystole
e. Atrial fibrillation

22. Який препарат належить до групи блокаторів Н2 – гістамінових рецепторів?
a. Омепразол
b. Альмагель
c. Алохол
d. Гастроцепін
e. Фамотидин

23. What parameter takes into account the deviation of the properties of a real solution from an ideal one?
a. Activity
b. Degree of dissociation

c. Fugacity
d. Concentration
e. Isotonic coefficient

24. What titrimetric method of analysis uses both external and internal indicators?
a. Nitritometry
b. Permanganatometry
c. Argentometry
d. Alkalimetry
e. Complexonometry

25. До якого виду хроматогафії відносять метод газорідинної хроматографії?
a. Афінної
b. Розподільної
c. Іоннобмінної
d. Гель-хроматографії
e. Адсорбційної

26. Corolla of a zygomorphic hermaphroditic flower consists of 5 petals: the largest one is called the banner, the two lateral petals are called the wings, and the two fused petals are forming the keel. Such corolla is characteristic of medicinal plants of Leguminosae family. Name the type of corolla:
a. Labiate
b. Funnelform
c. Tubular
d. Papilionaceous
e. Saucer-shaped

27. Surfactants are compounds that lower the surface tension (or interfacial tension) between two liquids, between a gas and a liquid, or between a liquid and a solid. Which of the following substances exhibits the properties of a surfactant at the air-water interface?
a. HCl
b. $NaOH$
c. Urea
d. Valeric acid
e. ---

28. What physico-chemical method is used to determine the pH of solutions for injections?
a. Amperometry
b. Polarography
c. Electrolysis
d. Potentiometry
e. Conductometry

29. During harvesting of a herbal raw material (belladonna), the plants had burns and patches of withering and rot. What microorganisms cause this kind of damage in plants?
a. Viroids
b. Protozoa
c. Mycoplasma
d. Microfungi
e. Viruses

30. What drug should not be prescribed for the treatment of arterial hypertension in a patient with gout?
a. Amlodipine
b. Hydrochlorothiazide
c. Cozaar (Losartan)
d. Enalapril
e. Atenolol

31. A student studies the digestive system of vertebrates. The organ that is being studied is primarily located in the right upper quadrant of the abdomen. It detoxifies various metabolites, produces hormones and digestive biochemicals, regulates glycogen storage, synthesizes proteins, and decomposes red blood cells. What organ is being studied by the student?

a. Kidneys
b. Heart
c. Pancreas
d. Lungs
e. Liver

32. За яким механізмом відбувається приєднання Br_2 до пропену?

a. S_E
b. A_E
c. S_R
d. S_N
e. A_N

33. In common corn (Zea mays), male spikelets are gathered in an apical panicle and female flowering spikelets form dense axillary spadices. What type of plant is Zea mays?

a. Monoecious
b. Polyecious
c. Monandrous
d. Dioecious
e. Unisexual

34. During the analysis of the cations that belong to the fourth analytical group (acid-base classification), their processing with a group reagent makes it possible not only to separate, but also to identify the following ions:

a. Zn(II) ions
b. Al(III) ions
c. Sn(IV) ions
d. As(III) ions
e. Cr(III) ions

35. A patient with gingivitis was prescribed oral cavity irrigation with 0.02% potassium permanganate solution. What group of antiseptics does this drug belong to?

a. Dyes
b. Detergents
c. Alcohols
d. Nitrofurans
e. Oxidants

36. Caffeine is one of the alkaloids contained in tea and coffee. Caffeine is contraindicated in case of:

a. Migraine
b. Essential hypertension
c. Addiction
d. Hypotension
e. Depression of nervous activity

37. Який збудник викликає захворювання сифіліс?

a. Mycobacterium tuberculosis
b. Treponema pallidum
c. Corynebacterium diphtheriae
d. Salmonella typhi
e. Borrelia recurrentis

38. During examination it appeared that the patient's sclera and oral mucosa are icteric. What biochemical blood value can be expected to be increased?

a. Albumin

b. Bilirubin
c. Amylase
d. Cholesterol
e. Glucose

39. Pastes are used in medicine to treat skin diseases. What type of disperse systems are they?
a. Powders
b. Aerosols
c. Foams
d. Suspensions
e. Emulsions

40. What solution is used to determine the mass-volume fraction of ammonia in a solution?
a. Potassium permanganate solution
b. Hydrochloric acid solution
c. Sulfuric acid solution
d. Sodium hydroxide solution
e. Iodine solution

41. The patient is presented to the hospital with the phenomena of growing respiratory failure. He has clinical signs of bilateral subtotal pneumonia. The clinical diagnosis is confirmed by X-ray examination. What type of respiratory failure does this patient most likely have?
a. Peripheral
b. Restrictive
c. Obstructive
d. Thoracic diaphragm
e. Central

42. Rhizome of a species belonging to the Asteraceae family is polycephalous, succulent, has lysigenous cavities, accumulates inulin. Such underground organ is characterisic of:
a. Inula helenium
b. Digitalis grandiflora
c. Helianthus annuus
d. Hyoscyamus niger
e. Sorbus aucuparia

43. Synthesis of a medicinal substance occurs in an isolated system. What is a direction criterion of spontaneous processes?
a. Enthalpy
b. Intrinsic energy
c. Helmholtz energy
d. Entropy change
e. Gibbs energy

44. For tetanus prevention, a toxin that has been neutralized with formalin (0.4%) at the temperature of 39°C for four weeks is used. What kind of preparation is it?
a. Immunoglobulin
b. Antitoxic serum
c. Inactivated vaccine
d. Anatoxin
e. Adjuvant

45. Serology is the leading method of syphilis diagnostics. What test is used to diagnose this disease?
a. Haddelson test
b. Gruber test
c. Wright test
d. Widal test
e. Wassermann test

46. Total protein in blood serum is one of metabolic indicators. What test is usually used in clinical laboratories to determine this value?
a. Lead acetate test
b. Xanthoproteic test
c. Ninhydrin test
d. Sodium nitroprusside test
e. Biuret test

47. Для яких систем характерна седиментація?
a. Розчинів ВМР
b. Суспензій
c. Розчинів електролітів
d. Розчинів неелектролітів
e. Золів

48. In what pair of substances the both of them form a precipitate of metallic silver when Tollens reagent is added (during heating)?
a. Propanal and acetic acid
b. Acetic acid and formic acid
c. Propanol and formic acid
d. Ethanol and formic acid
e. Propanal and formic acid

49. Який із нижченаведених антигіпертензивних препаратів призначається пацієнтам із бронхіальною астмою?
a. Фармадипін
b. Лабеталол
c. Метопролол
d. Надолол
e. Анаприлін

50. After a physical exertion, a patient developed an angina pectoris attack caused by myocardial ischemia. What definition most accurately describes the concept of ischemia?
a. Increased oxygen delivery to tissues
b. Decreased erythrocyte count in the blood
c. Discrepancy between the blood supply to the tissues and the need for it
d. Oxygen deficiency in the circulatory system
e. Dilation of arterioles

51. What pair of compounds can be classified as functional group isomers?
a. Butane and isobutane
b. Propanal and propanone
c. Pentene-1 and pentene-2
d. Hexane and cyclohexane
e. Benzene and methylbenzene

52. During bacteriology of the feces of a patient with diarrhea, a pure culture of rod-shaped, slightly bent microorganisms was isolated. In the microslide, these microorganisms resemble schools of fish. Their inoculation on alkaline media (alkaline peptone water) results in formation of a blue-tinted film after 6 hours. What pathogen has such properties?
a. Salmonellae
b. Escherichia coli
c. Mycobacteria
d. Spirochetes
e. Vibrio cholerae

53. A patient was prescribed losartan for treatment of arterial hypertension. What mechanism of action does this drug have?
a. Inhibition of angiotensin-converting enzyme

b. Activation of central α-adrenoceptors
c. Calcium channel blockade
d. Angiotensin-receptor blockade
e. Inhibition of phosphodiesterase

54. In the course of an experiment in the mesenteric vein of a toad a trombus was created with a crystal of common salt. What processes occurred during the first stage of trombus formation?
a. Production of active thromboplastin
b. Adhesion, aggregation, agglutination of platelets
c. Production of thrombin
d. Production of fibrin polymer
e. Production of fibrin monomer

55. Interferons are natural antiviral and antitumor agents. What is their mechanism of action?
a. Protein synthesis depression
b. Replication activation
c. Protein synthesis increase
d. Transcription activation
e. Repair activation

56. Який основний метод лабораторної діагностики ВІЛ інфекції?
a. Реакція пасивної гемаглютинації
b. Імунофлуоресцентний
c. Імуноферментний аналіз
d. Радіоімунний аналіз
e. Реакція коаглютинації

57. In medical practice barbiturates are used as sleeping pills. These substances act similar to rothenone and are inhibitors of tissue respiration. The mechanism of their action takes place on the enzymatic level. Which of the following enzymes do these substances inhibit?
a. Succinate dehydrogenase
b. NADH-coenzyme Q reductase
c. Adenosine triphosphate synthetase
d. Cytochrome oxidase
e. Cytochrome C reductase

58. There are certain patterns of chemical and biological processes occurring with the drug in the body. Reduced absorption of tetracycline when it is co-administered with antacids is an example of:
a. Functional antagonism
b. Synergism
c. Pharmacokinetic incompatibility
d. Pharmaceutical incompatibility
e. Pharmacodynamic incompatibility

59. A benzimidazole derivative, omeprazole, has been prescribed to a patient with a duodenal ulcer accompanied by an increased secretion of gastric juice. What is the mechanism of action of this drug?
a. Stimulation of H2-histamine receptors
b. Blockade of M1-cholinergic receptors
c. Irreversible blockade of H^+, K^+ -ATPase
d. Blockade of H2-histamine receptors
e. Stimulation of H^+, K^+ -ATPase

60. A human is immune to the plague of cattle and dogs. What type of immunity is it?
a. Innate
b. Natural passive
c. Natural active
d. Artificial active
e. Artificial passive

61. Як називаються реакції в яких багаторазово повторюється цикл елементарних актів за участю активних частинок?

a. Ланцюгові
b. Фотохімічні
c. Паралельні
d. Послідовні
e. Пов'язані

62. The researcher while conducting the qualitative analysis that involves sulfates precipitation of the third analytical group cations (Ca^{2+, Sr^{2+, Ba^{2+) has to reduce solubility of sulfates. What substance should he use for this purpose?

a. Benzene
b. Ethyl alcohol
c. Amyl alcohol
d. Distilled water
e. Chloroform

63. Name the ability of high-molecular compounds to prevent precipitation of lyophobic sols and deposition of cholesterol plaques on the vessel walls:

a. Thixotropy
b. Coacervation
c. Sedimentation
d. Coagulation
e. Colloid protection

64. A man developed agranulocytosis after pneumonia treatment with sulfonamides. Antibodies to neutrophils were detected in the patient's blood. This pathology belongs to the following type of allergic reactions:

a. Immune complex
b. Reactive
c. Anaphylactic
d. Cytotoxic
e. Cell-mediated

65. The fruit is a bright-red juicy follicetum with a sweet-sour taste. Its seeds are kidney-shaped and smell similar to lemon. Such fruits belong to:

a. Sorbus aucuparia
b. Schisandra chinensis
c. Viburnum opulus
d. Citrus limon
e. Malus domestica

66. One hour after a child took polyvitamins in the dosage form of a syrup, the child developed a markedly itching urticaria-type rash all over the body. What type of allergic response can be characterized by this sign?

a. Cytotoxic
b. Delayed-type hypersensitivity
c. Autoallergic
d. Anaphylactic
e. Immune complex

67. До якого класу сполук належить Цитохром Р450?

a. Нуклеопротеїн
b. Флавопротеїн
c. Ліпопротеїн
d. Гемопротеїн
e. Піридинопротеїн

68. Select a nucleophile among the particles and molecules given below.

a. CH_3Cl
b. ddotNH_3
c. H^+
d. AlCl_3
e. NO_2^+

69. In the process of creating vaccines, pathogens of infectious diseases are being attenuated. What is the essence of the attenuation process?
a. Artificial reduction of virulent properties of pathogens
b. Inactivation of pathogens while preserving the antigenic structure of cells
c. Isolation of protective antigens from microbial cells
d. Reduction of immunogenicity of the pathogen
e. Discovering antigenic determinants of the main antigens of the pathogen

70. According to Van't Hoff rule, when the temperature is raised by 10 degrees, the reaction rate increases by:
a. 2--4 times
b. 1.5 times
c. 10 times
d. 5 times
e. Temperature does not affect reaction rate

71. What drug inhibits cholesterol synthesis in the liver?
a. Atorvastatin
b. Probucol
c. Parmidinum
d. Colestipol
e. Fenofibrate

72. A patient has been diagnosed with acute pancreatitis. For diagnostic purposes, it is necessary to measure the activity of a certain enzyme in the patient's blood. What enzyme is it?
a. Aldolase
b. Pepsin
c. Amylase
d. Creatine kinase
e. Lactate dehydrogenase

73. In cases of severe pancreatitis, physicians usually prescribe the drugs that help prevent pancreatic autolysis. These drugs inhibit the following type of enzymes:
a. Phosphatases
b. Dehydrogenases
c. Amylases
d. Lipases
e. Proteases

74. In the patient, a gallstone lodged in the common bile duct has blocked the flow of bile into the intestine. What digestive process will be disturbed in this case?
a. Digestion of carbohydrates
b. Absorption of carbohydrates
c. Digestion of fats
d. Digestion of proteins
e. Absorption of proteins

75. What type of indicators is used in the acid-base method of quantitative analysis?
a. Redox indicators
b. Chemiluminescent indicators
c. Metallochromic indicators
d. pH indicators
e. Adsorption indicators