### BIOLOGY:

1) What are the basic components of proteins?
   - A) fatty acids
   - B) polysaccharides
   - C) lipids
   - D) amino acids

2) What is the true statement about phagocytosis?
   - A) it is an efflux of solid particles from cells
   - B) it occurs only in bacteria
   - C) it is import of solid particles into the cell
   - D) it is import of liquid particles into the cell

3) What is synthesized on the rough endoplasmic reticulum?
   - A) proteins
   - B) oligosaccharides
   - C) lipids
   - D) polysaccharides

4) Which process takes place in lysosomes?
   - A) cellular respiration
   - B) cellular digestion
   - C) synthesis of proteins
   - D) synthesis of lipids

5) What is chromatin?
   - A) overall extranuclear matter
   - B) complex of proteins and DNA
   - C) complex of proteins and RNA
   - D) DNA and RNA

6) Which compounds are not part of ribonucleic acid (RNA):
   - A) phosphate
   - B) purines
   - C) deoxyribose
   - D) pyrimidines

7) What structural components are not part of cytoskeleton?
   - A) microtubules
   - B) actin filaments
   - C) thylakoids
   - D) intermediate filaments

8) Translation is the process of translating the sequence of a mRNA molecule into the:
   - A) primary structure of protein
   - B) primary structure of sugar
   - C) primary structure of lipid
   - D) primary structure of nucleic acid
9) Prokaryotic cells can be found in:
   A) bacteria
   B) plants
   C) protozoa
   D) animals

10) Mitosis is the process composed of four phases occurring in exact sequence:
   A) prophase - telophase - anaphase - metaphase
   B) prophase - anaphase - telophase - metaphase
   C) prophase - anaphase - metaphase - telophase
   D) prophase - metaphase - anaphase - telophase

11) Constricted central region, where the two chromatids are held together, is known as:
   A) centromere
   B) dictyosome
   C) telomere
   D) centrosome

12) Number of chromosomes in haploid cell of the human body is:
   A) 46
   B) 23
   C) 12
   D) 24

13) The set of all traits of organism is known as:
   A) genotype
   B) phenotype
   C) allele
   D) karyotype

14) Mother has blood group 0 and father has blood group A. What types of blood group can be found in their children?
   A) AB
   B) A, B
   C) 0, A
   D) 0, B

15) Offsprings from crossing of a dominant homozygote and a recessive homozygote are:
   A) homozygous dominant with a probability of 100%
   B) homozygous recessive with a probability of 50%
   C) heterozygous with a probability of 25%
   D) heterozygous with a probability of 100%
16) Typical alkaloidal plant family is:
   A) Lamiaceae
   B) Apiaceae
   C) Papaveraceae
   D) Asteraceae

17) Primary metabolites are present:
   A) in all plants
   B) in plant families Asteraceae, Apocyneceae
   C) in fungi
   D) only in roots of plants

18) Abscisic acid belongs to:
   A) plant hormones – stimulators
   B) secondary metabolites
   C) alkaloids
   D) plant hormones – inhibitors

19) Plants of Solanaceae family belong to the toxic plans because they contain:
   A) cardioactive glycosides
   B) proteins
   C) alkaloids
   D) terpenoids

20) Photosynthetic processes occur in:
   A) nucleus
   B) chloroplasts
   C) vacuoles
   D) mitochondria

21) What does not belong among photosynthetic pigments?
   A) carotenoids
   B) chlorophyls
   C) alkaloids
   D) xanthophyls

22) What does belong among plant hormones inhibitors?
   A) auxines
   B) ethylene
   C) morphine
   D) cytokinines

23) Plant family Lamiaceae is known for production of:
   A) essentials oil
   B) fatty acids
   C) alkaloids
   D) sugar
24) What is rhizodermis?
   A) root epidermis
   B) rhizome pith
   C) root subepidermal tissue
   D) inner layer of primary cortex

25) Which organisms are heterotrophic?
   A) fungi and non-green plants
   B) green plants
   C) algae
   D) Cyanobacteria

26) Which blood vessel enters right atrium of the heart?
   A) superior vena cava
   B) coronary artery
   C) pulmonary artery
   D) portal vein

27) Cardiac output (amount of blood released from left ventricle in one minute) is:
   A) 200 l/min
   B) 5 ml/min
   C) 300 ml/min
   D) 5 l/min

28) Heart activity can be directly increased by:
   A) adrenalin
   B) parasympathetic nervous system
   C) acetylcholine
   D) cerebellum

29) Blood is physiologically produced in adults only in:
   A) heart
   B) blood vessels
   C) bone marrow
   D) liver

30) Physiological life span of erythrocytes is:
   A) 110 – 120 days
   B) 5 – 10 days
   C) 7 – 10 years
   D) 365 – 380 days
### Question 31
Which structure belongs to the lower respiratory tract?
- A) trachea
- B) paranasal sinuses
- C) nasopharynx
- D) nasal cavity

### Question 32
Which hormone is produced in adrenal glands?
- A) prolactin
- B) thyroxin
- C) testosterone
- D) aldosterone

### Question 33
Which enzyme participates in the protein digestion in the small intestine?
- A) trypsin
- B) pepsin
- C) amylase
- D) lipase

### Question 34
Which hormone reduces glucose level in blood (hypoglycemic effect)?
- A) insulin
- B) acetylcholine
- C) gastrin
- D) glucagon

### Question 35
Which hormone is produced in the thyroid gland?
- A) adrenalin
- B) insulin
- C) tyrosine
- D) thyroxin

### Question 36
Which substance is not physiologically presented in the final urine?
- A) urea
- B) water
- C) sodium
- D) glucose

### Question 37
Light sensitive elements rods and cones are located in:
- A) ciliary body
- B) retina
- C) choroid
- D) sclera
38) Which blood cells in the blood are at least in number:
   A) red blood cells
   B) white blood cells
   C) thrombocytes
   D) erythrocytes

39) Which of below mentioned blood cells do not contain nucleus (in physiological condition):
   A) macrophages
   B) erythrocytes
   C) T lymphocytes
   D) B lymphocytes

40) Physiological pH of blood is:
   A) 1.4 ± 0.04
   B) 7.4 ± 0.04
   C) 74 ± 0.04
   D) 10.4 ± 0.04

41) Which vessel delivers blood into the lungs?
   A) aorta
   B) pulmonary artery
   C) superior vena cava
   D) pulmonary veins

42) Breathing (respiratory) control center is located in the:
   A) lungs
   B) medulla oblongata
   C) cerebellum
   D) spinal cord

43) Which hormone decreases blood pressure?
   A) adrenalin
   B) acetylcholine
   C) noradrenalin
   D) aldosterone
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| 44)      | Nephron is functional unit located in:  
A) liver  
B) kidney  
C) stomach  
D) lungs |
| 45)      | Digestion of carbohydrates (sugars) starts in:  
A) stomach  
B) mouth cavity  
C) small intestine  
D) esophagus |
| 46)      | Which of below mentioned parts is not a part of small intestine?  
A) duodenum  
B) colon  
C) jejunum  
D) ileum |
| 47)      | Which enzyme participates on carbohydrates digestion?  
A) lipase  
B) amylase  
C) pepsin  
D) chymotrypsin |
| 48)      | Insulin is produced in:  
A) liver  
B) Langerhans islet of pancreas  
C) Langerhans islet of stomach  
D) kidney |
| 49)      | Bile is produced in:  
A) small intestine  
B) liver  
C) stomach  
D) pancreas |
| 50)      | Nutrients are transported from small intestine to the liver by:  
A) aorta  
B) portal vein  
C) inferior vena cava  
D) hepatic artery |
CHEMISTRY:

1) Dalton’s atomic theory postulated that matter:
   A) is in continuous motion
   B) is composed of small particles called atoms
   C) can exist in three states – gas, liquid, and solid
   D) changes in mass when heated to combustion

2) Indicate which of the following formulas is named incorrectly:
   A) P_{4}O_{10} tetraphosphorus decaoxide
   B) SF_{6} sulfur(VI) fluoride
   C) FeSO_{4} iron(III) sulfate
   D) Ca_{3}(PO_{4})_{2} tricalcium bis(phosphate)

3) The formula of hydrogen peroxide is:
   A) H_{2}O_{3}
   B) H_{2}O_{2}
   C) H_{2}O_{4}
   D) H_{2}O

4) Indicate which an element has the false element symbol:
   A) argon Ar
   B) rhenium Re
   C) lead Ld
   D) manganese Mn

5) Which of the following is an incorrect statement?
   A) Na and Cs are in the same group in the periodic table
   B) elements in the same period of the periodic table have similar properties
   C) fluorine is classified as a nonmetallic element
   D) most of the known chemical elements are classified as metals

6) Which of the following sets of quantum numbers is not allowed:
   A) n = 3 l = 2 m_{l} = 0 m_{s} = 1/2
   B) n = 4 l = 3 m_{l} = -1 m_{s} = -1/2
   C) n = 3 l = 1 m_{l} = -1 m_{s} = -1/2
   D) n = 2 l = 1 m_{l} = -2 m_{s} = 1/2
7) Silicon has the following number of valence electrons:
   A) 2
   B) 5
   C) 8
   D) 4

8) The halogens (Group 17) all have valence shell structure:
   A) \( ns^2np^7 \)
   B) \( ns^2np^8 \)
   C) \( ns^2np^3 \)
   D) \( ns^2np^5 \)

9) The \( d \) subshell can accommodate, for any given principal quantum number, the following number of electrons:
   A) 5
   B) 6
   C) 10
   D) 14

10) Indicate which order of electronegativity is false:
    A) \( F > Cl > Br > I \)
    B) \( O > N > C \)
    C) \( O > S > Te \)
    D) \( O > F > N \)

11) Which of the following elements does not consist of diatomic molecules:
    A) oxygen
    B) chlorine
    C) helium
    D) nitrogen

12) Complete the following equation \( NH_4^+ + H_2O \rightarrow \)
    A) \( NH_3 + H_2O \)
    B) \( NH_4^+ + OH^- \)
    C) \( NH_2^- + H_2O \)
    D) \( NH_3 + H_3O^+ \)
13) Consider which of the following acids is the strongest Brønsted acid:
   A) HF  
   B) HI  
   C) HCl  
   D) HBr

14) Choose compound in which the oxidation number (oxidation state) of hydrogen is -I:
   A) HI  
   B) NaH  
   C) H₂O₂  
   D) HClO

15) Indicate metal which reacts according to the following reaction 2M + 2H₂O → 2MOH + H₂:
   A) Zn  
   B) Na  
   C) Fe  
   D) Pt

16) The reaction products of the reaction Cl₂ + NaOH → are:
   A) NaCl + H₂O  
   B) NaOCl + H₂O  
   C) NaOCl + H₂  
   D) NaOCl + NaCl + H₂O

17) Which of the following oxides has amphoteric behavior?
   A) SO₂  
   B) Na₂O  
   C) P₂O₅  
   D) Al₂O₃

18) Indicate compound which is not oxidizing agent:
   A) nitric acid  
   B) chlorine  
   C) hydrogen  
   D) sodium hypochlorite
19) Which of the following is oxidation-reduction reaction?
   A) $I_2 + 2KCl \rightarrow Cl_2 + 2KI$
   B) $K_2SO_4 + Ba(NO_3)_2 \rightarrow BaSO_4 + 2KNO_3$
   C) $NaOH + HCl \rightarrow NaCl + H_2O$
   D) $CO_2 + H_2O \rightarrow H_2CO_3$

20) Which of the following compounds contains ionic bonds?
   A) XeF$_4$
   B) CS$_2$
   C) H$_2$SO$_4$
   D) NaI

21) In a sample of hydrogen gas there are $4.92 \times 10^{18}$ hydrogen atoms. How many methane molecules could be formed?
   A) $4.92 \times 10^{18}$ molecules
   B) $4.92 \times 10^4$ molecules
   C) $1.23 \times 10^{18}$ molecules
   D) $1.23 \times 10^{4.5}$ molecules

22) Determine the empirical formula of a compound that contains 89.7% bismuth and 10.3% oxygen. [AW of Bi is 209; AW of O is 16]
   A) BiO
   B) BiO$_2$
   C) Bi$_2$O
   D) Bi$_2$O$_3$

23) Aluminium chloride is prepared from hydrogen chloride gas and aluminum metal.
   $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$
   Suppose a reaction vessel contains 0.15 mol Al and 0.30 mol HCl. How many moles of AlCl$_3$ can be prepared from this mixture?
   A) 0.15 mol
   B) 0.30 mol
   C) 0.10 mol
   D) 0.50 mol

24) What volume of 12.4 M HCl would you need to make 500.0 mL of 3.50 M HCl?
   A) 500 mL
   B) 71 mL
   C) 141 mL
   D) 124 mL
25) If 15.6 g NaCl is dissolved in water to make 275 mL of solution, what is the molarity of the solution? [MW of NaCl is 58.44 g/mol]
   A) 0.266 M  
   B) 0.057 M  
   C) 0.212 M  
   D) 0.971 M

26) Multiple bonds in organic compounds can form elements:
   A) N, P, H, O  
   B) S, Cl, O, Br  
   C) C, N, O, P  
   D) H, B, S, O

27) The structure represents:
   A) secondary alcohol  
   B) a substance that cannot be esterified  
   C) aromatic alcohol  
   D) a substance from which a halogen derivative can be prepared via a polar substitution

28) Configuration cannot be determined for
   A) Valine  
   B) 4-Chlorobutan-1-ol  
   C) Serine  
   D) Glucose

29) Acetylene
   A) is released by reaction of carbanilide with water  
   B) has acidic hydrogens  
   C) is non-flammable  
   D) has all three carbons in sp hybridization

30) The reaction of benzene with acetyl chloride
   A) is feasible in the presence of a Lewis base  
   B) provides the acetylated benzoic acid  
   C) in the presence of AlCl₃ provides Friedel-Crafts acylation  
   D) leads to the benzene acetylene preparation
31) Naphthalene
   A) is cycloalkane
   B) contains two saturated rings
   C) is aromatic
   D) doesn’t undergo electrophilic substitution

32) Which of these compounds is not stable
   \[
   \begin{align*}
   &A) \quad \text{CH}_2=\text{C}–\text{H}_2\text{CH}_3, \\
   &B) \quad \text{CH}_2=\text{C}–\text{CH}_3, \\
   &C) \quad \text{CH}_2=\text{C}–\text{H}_2\text{CH}_3, \\
   &D) \quad \text{CH}_3–\text{C}–\text{OCH}_3
   \end{align*}
   \]

33) Which of the following substances provides a stable salt in the aqueous solution:
   A) 2-Hydroxyethyl acetate
   B) Ethanol
   C) tert-Butanol
   D) Phenol

34) Which derivative of acetic acid is hydrolyzed most rapidly
   A) Acetamide
   B) Acetyl chloride
   C) Acetohydroxamic acid
   D) Acetic anhydride

35) Waxes are
   A) esters of glycerol and fatty acids
   B) compounds of higher fatty alcohols and tricarboxylic acids
   C) amides of higher fatty alcohols and higher fatty acids
   D) strongly lipophilic substances of plant and animal origin

36) A common feature of all the natural amino acids is that they have the absolute configuration:
   A) D, L
   B) d
   C) +
   D) L

37) CH\textsubscript{3}CH\textsubscript{2}SCH\textsubscript{2}CH\textsubscript{3} is called
   A) thiol
   B) sulfone
   C) sulfide
   D) sulfite
38) Grignard compounds have
   A) lithium
   B) structural fluctuation
   C) always about 5% of carbonyl compounds
   D) magnesium

39) Which statement is true about the reaction?
   Reaction is: \( \text{CH}_3\text{Br} + \text{NaOH} \rightarrow \text{CH}_3\text{OH} + \text{NaBr} \)
   A) reversible
   B) nucleophilic substitution
   C) cannot undergo
   D) typical rearrangement

40) Benzoic acid is formed by
   A) addition of \( \text{CO}_2 \) on benzene ring
   B) addition of –COOH on benzene ring
   C) oxidation of toluene
   D) reduction of phenol

41) Conversion of cyclohexanone to cyclohexanol is
   A) reduction
   B) oxidation
   C) elimination
   D) degradation

42) The basic building block of cell membranes are
   A) aminolipids
   B) glycolipids
   C) proteolipids
   D) phospholipids

43) The hydrolysis of fats is
   A) their reaction with soap
   B) their reaction with glycerol
   C) their reaction with alkali hydroxide
   D) enzymatic reactions occurring in the liver only
44) The core structure of steroids, cyclopentanoperhydrophenanthrene, is a hydrocarbon with the following number of rings
   A) 4
   B) 6
   C) 3
   D) 1

45) Genetic information is encoded in
   A) nucleosides
   B) nucleotides
   C) nucleic acids
   D) nucleic bases

46) Sugar molecule present in the DNA is
   A) ribose
   B) 2-deoxyribose
   C) 3-deoxyribose
   D) 4-deoxyribose

47) Bases in nucleic acids are bounded to each other by
   A) hydrogen bonds
   B) non-binding hydrophobic interactions
   C) covalent bonds
   D) ion interactions

48) Codon is
   A) a triplet of bases in mRNA molecule corresponding to a DNA triplet
   B) receptor of a steroid nature
   C) A roll of protein fiber from which silk is obtained by untangling
   D) base pairs in the molecule of RNA corresponding to DNA doublets

49) The binding of substrate to the enzyme is most often
   A) reversible
   B) covalent
   C) irreversible
   D) metamorphic
50) Mark improper statement for sucrose
A) it is disaccharide
B) it is the beet sugar
C) it contains fructose in molecule
D) it is maltose