**Syllabus in Biology**

**Entrance exams 2023**

Module 1. HUMAN ANATOMY AND PHYSIOLOGY

1. The levels of organization in the human organism. Tissues in the human organism.

2. Digestive system. Eating. Digestion, Vitamins

3. Respiratory system. Breathing.

4. Kidney. Urine formation

5. Cardiovascular system. Heart and blood vessels. Blood circulation

6. Blood. Immunity. Regulation and homeostasis. Immunological mechanisms of homeostasis.

7. Skeletal System Bones, Spine, Chest and Limbs. Muscular System

8. Reproductive system. Male and female reproductive system. Fertilization.

9. Nervous system. Spinal cord. Brain. Vegetative nerve system. The sense organs.

10. Endocrine system. Pituitary gland, thyroid gland, parathyroid glands. Pancreas, adrenal glands

Module 2. CELL

1. Chemical composition of the cell. Inorganic molecules and ions. Organic compound: monosaccharides, aminoacids, lipids, nucleotides. Macromolecules – polysaccharides, proteins, nucleic acids.

2. Supramolecular complexes. Viruses

3. Enzymes. Mechanism of action and regulation of enzyme activity.

4. The cell – elementary unit of living matter. Characteristics of prokaryotic cell.

5. Eukaryotic cell. Cell organelles - organization, functions

6. Metabolism - anabolic and catabolic processes. Biological oxidation and oxidative phosphorylation.

8. Genetic processes - replication, transcription, "maturation" of RNA, translation, genetic code.

9. Cell life cycle and cell differentiation. Cell division.

Module 3: FUNDAMENTALS OF GENETICS

# 1. Heredity. Mendel’s experiments and laws of inheritance - Monohybrid and Dihybrid Crosses . Punnett square. Allelic and non-allelic interactions. Sex-linked inheritance

# 2. Genetic modification. Mutations.

3. Human genetics. Genetic disorders in human

**Example questions in biology**

1) Which of the following is NOT included in the respiratory system?  
a) Trachea  
**b) Esophagus**c) All of these are respiratory organs  
d) Mouth

2) According to Mendel’s Law of dominance, a heterozygous organism will display the effect of:

**a) the dominant allele**

b) both alleles - intermediate phenotype

c) the recessive allele

d) the more colorful allele

3) Which of the following statements about the blood in human is correct?

a) lymphocytes are the most plentiful blood cells

b) the blood in the circulatory system consists of serum and blood cells

c) the red blood cells contain nuclei

d) **the blood in the circulatory system consists of plasma and blood cells**

4) Which of the listed proteins is the most abundant protein of the connective tissues?

a) albumin

b) pepsin

**c) collagen**

d) trypsin

5) Which of the following are supportive connective tissues?

a) bone and skin

b) cartilage and muscle

**c) bone and cartilage**

d) skin and cartilage

6) What is the main function of vitamins of B complex?

**a) cofactors of enzymes**

b) in normal vision

c) in blood clotting

d) in regulation of calcium

7) During which phase in the cell cycle does DNA replication happen?

1. G1 phase
2. G2 phase
3. **S phase**
4. M phase

8) What is the correct statement about the breastbone (sternum)?

**a) connects to the ribs with cartilage**

b) it is a long type bone, which sits at the front of the chest

c) it is a part of the spine

d) connects clavicle to the scapula

9) Which of the statements about the blood serum is correct?

a) it can form clot

b) it has the same composition as the blood plasma

c) it contains white blood cells

**d) it does not contain fibrinogen**

10) Which is/are the final product/s of the digestion of starch in the gastrointestinal tract?

a) fructose

b) amino acids

c) fatty acids

**d) glucose**

11) What is the main function of Vitamin A (retinol)

a) cofactor of enzymes

**b) in normal vision**

c) in blood clotting

d) in regulation of calcium

12) Which of the following statements is FALSE?  
a) **Prokaryotes and eukaryotes have identical ribosomes**b) Prokaryotes lack a nucleus  
c) Prokaryotes usually are smaller in size that eukaryotes  
d) Prokaryotes do not undergo meiosis

13) Which of the following types of biological molecules store the genetic information?

1. Ribonucleic acids
2. Proteins
3. **Deoxyribonucleic acids**
4. Phospholipids

14) Which classes of molecules are nonpolar and hydrophobic in nature?

1. Carbohydrates
2. Proteins
3. Nucleic acids
4. **Triacylglycerols**

15) Which term refers to the filament structures that move the chromatids to opposite poles of a cell during mitosis?  
a) Microfilaments  
**b) Spindle fibers**  
c) Flagellum/flagella  
d) Centrioles

16) Which type of RNAs contain sequences called “codons”?

1. **mRNA**
2. tRNA
3. rRNA
4. miRNA

17) Which of the following is TRUE regarding viruses?

1. **A virus can only live and multiply inside of host cells**
2. Viruses are single-celled (unicellular) organisms
3. Viral genome could be made up of proteins
4. All of the above

18) Each metaphase chromosome consists of two identical:

1. genes
2. alleles
3. **chromatids**
4. arms

19) How many chromosomes would you expect to find in gametes if the diploid number of chromosomes is 20?

1. **10**
2. 20
3. 30
4. 40

20) Which of the following statements is true with regard to ATP?

1. **ATP is a molecule that accumulate and carries energy within prokaryotic and eukaryotic cells**
2. ATP is a molecule that accumulates and carries energy only within eukaryotic cells
3. When ATP is synthesized free energy is released
4. ATP can be produced only through aerobic respiration