

TOPICS ON BIOLOGY FOR ADMISSION TEST

1. Basic structure and characteristics of the eukaryotic cell (cellular organelles, structure, function).
2. Basic metabolic pathways: glycolysis, biological oxidation, photosynthesis (the biological role and basic characteristics of enzymes).
3. The DNA and its role in heredity: the structure of DNA, the genetic code, the replication of the genetic material.
4. Cell division I.: Chromatin, chromosomes. The behaviour of chromosomes during mitosis.
5. Cell division II.: Meiosis. The role of meiosis in sexually reproducing organisms.
6. Genetics I.: Genotype, phenotype, genes, alleles. Monohybrid cross, dominant-recessive type of inheritance, co-dominance. The first Mendelian law of inheritance.
7. Genetics II.: X-linked inheritance. Dihybrid cross: the second Mendelian law of inheritance. Genetic linkage, crossing-over.
8. From DNA to protein: Translation, mRNA, rRNA, tRNA, ribosomes.
9. Basic anatomy and physiology of the human respiratory system.
10. Basic anatomy and physiology of the human circulatory system.
11. Basic anatomy and physiology of the human digestive system.
12. Basic anatomy and physiology of the human excretory system.
13. Homeostasis: the basic structure and function of the human nervous system.
14. Homeostasis: hormones, the human endocrine system.
15. Basic structure and function of skeletal muscle cells, locomotion in humans.
16. The basic defense systems against infections: the humoral and cellular immune response in humans.

Textbook: Sadava, Heller, Orians, Purves, Hillis (ed.): *Life. The Science of Biology, 8th. Edition.* Sinauer Associates, INC., VHPS/W.H. Freeman and Co. Gordonsville, VA, U.S.A.

TOPICS ON CHEMISTRY FOR ADMISSION TEST

GENERAL CHEMISTRY

Chemical reactions, types of chemical reactions
The structure of the atom
The composition of nucleus
Isotopes
Electronic structure of the elements (quantum numbers, orbital, electronic configuration)
Periodic table, periodic perspective: atomic and ionic radii, ionization energy, electron affinity electro negativity
Chemical bonds, the metallic, ionic and covalent bonds
Intermolecular forces
Changes of state of the matter. gaseous, liquid and solid states, relationship between phase phase diagrams
Aqueous solutions, electrolytes and nonelectrolytes, acids and bases.

INORGANIC CHEMISTRY

Hydrogen and oxygen, oxidation state, oxidation and reduction
Properties and reactions hydrogen and oxygen, compounds of hydrogen and oxygen
The halogens, compounds of the halogens
Noble gases, sources and uses of noble gases
Nitrogen, phosphorous, and sulfur
Industrial acids, compounds of nitrogen, phosphorus, and sulfur
Carbon, allotropic forms of carbon, inorganic compounds of carbon
Metals and metallurgy
The s- and p-block metals, transition metals

ORGANIC CHEMISTRY

Covalent bonds of carbon, multiple covalent bonds in carbon compounds
Hydrocarbons, alkenes and cycloalkenes alkenes and alkynes
Aromatic hydrocarbons, heteroaromatic compounds
Alcohols and ethers aldehydes and ketones
Carboxylic acids, calculation of acidity
Salts, detergents
Esters and anhydrides
Amines and amides, calculation of basicity
Halogen, sulfur, phosphorus containing compounds
Isomerism in organic chemistry, structural, geometrical and optical isomers

**Textbook: McMurry, J., Fay, R.C. (2008): *Chemistry, 5th Edition.*
Pearson Education, Inc., Upper Saddle River, NJ 07458.**

TOPICS ON PHYSICS FOR ADMISSION TEST

1. Describing motion (distance, speed and acceleration)
2. Newton's laws of motion
3. Scalar and vector quantities
4. Mechanical work, kinetic and potential energy
5. Elastic and inelastic collisions, conservation of linear momentum
6. Uniform circular motion, centripetal force
7. Mechanical advantage, simple mechanical tools (the inclined plane, the screw, the pulley)
8. Pressure in fluids (Pascal's principle), Archimedes' principle, The hydraulic press
9. Harmonic motion, Hooke's law
10. Wave motion, longitudinal and transverse waves, resonance
11. Kinetic theory of gases, the temperature
12. The first and second laws of thermodynamics
13. The electric field, Coulomb's law
14. The electric current, Ohm's law
15. Simple electric circuits. Kirchhoff's laws
16. Electromagnetic induction, the transformer
17. Propagation of light, reflection and refraction, optical lenses mirrors
18. The structure of atoms, the electron shell and the atomic nucleus
19. X-rays
20. Radioactivity

Textbook: Raymond A. Serway, Jerry S. Faughn, Chris Vuille (2009): *College Physics, 8th Edition*. Brooks/Cole, Cengage Learning