BIOLOGY ENTRANCE TESTING PROGRAM FOR APPLICANTS TAKING THE EXAM IN ENGLISH.

BOTANY.

Botany is the science of plants. Plants are a holistic organism. Flora as an integral part of nature, its diversity and distribution on Earth.

Root. Root functions. Development of the root from the germinal root of the seed. Types of roots (main, lateral, adventitious). Types of root systems (rod and fibrous). root zones. Root cap. External and internal structure of the root. Root growth. Soil as a medium for plant life. Absorption of water and mineral salts by roots. Fertilizers. The value of tillage, fertilization.

The escape. A kidney is a rudimentary shoot, its structure. Development of an escape from the kidney.

Stem. Stem growth in length. The internal structure of a woody stem in relation to its functions. Stem growth in thickness. The formation of annual rings. Tree age. The movement of mineral and organic substances along the stem. Modified shoots: rhizome, tuber, bulb.

Sheet. The external structure of the leaf. Leaf venation. Simple and compound leaves. Leaf arrangement. Features of the internal structure of the leaf in connection with its functions:

integumentary tissue (skin and stomata), basic, conductive and mechanical tissues.

The role of green plants in nature, human life and their protection.

Vegetative propagation of flowering plants, its role in nature and crop production. A flower is an organ of seed reproduction. Perianth, stamens, pistil. Inflorescences and their biological significance. Cross-pollination by insects and wind.Self-pollination.

Germination of pollen. Fertilization. Formation of seed and fruit.

Seed. The structure of seeds (on the example of dicotyledonous and monocotyledonous plants). Conditions for seed germination. Seed respiration. The main groups of plants.

Seaweed. Unicellular and multicellular algae. The structure and features of life. Algae reproduction. Seaweed. The value of algae in nature and economy.

Mosses. Green mosses. Structure, reproduction on the example of cuckoo flax. Sphagnum moss.

The formation of peat, its significance.

Ferns. structure and reproduction. Horsetails and club mosses. Significance in nature and human life. Gymnosperms. Structure and reproduction on the example of pine. The distribution of conifers, their importance in nature and the national economy.

Angiosperms (flowering). Features of the structure, reproduction and life. The dominance of angiosperms in the modern flora and their advantage over other groups of plants. The main families of angiosperms, their significance.

Influence of human economic activity on the species diversity of flowering plants. Red Book. Protection of rare plant species.

bacteria. Mushrooms. Lichens.

bacteria. The structure and activity of bacteria. Reproduction of bacteria. Spread of bacteria in air, soil, water and living organisms. Pathogenic bacteria and their control.

The role of bacteria in nature, medicine, agriculture and industry.

Mushrooms. General characteristics of mushrooms. Hat mushrooms, their structure, nutrition and reproduction. Symbiosis of fungi with plants. Edible and poisonous mushrooms. Mold mushrooms.Penicillium, its use for obtaining antibiotics. Yeast. Parasitic fungi that cause disease in plants and animals. The role of fungi in nature and economy.

Lichens. The structure of lichens. Nutrition. Reproduction. The role of lichens in nature and

human life.

ZOOLOGY.

Zoology is the science of animals. The importance of animals in nature and human life.

Type Protozoa. General characteristics of the type.

Amoeba common. Habitat. Movement. Nutrition. Breath. Selection. Reproduction. Encystation.

Variety of unicellular animals (Green Euglena, Infusoria - slipper, Malaria parasite).

Type Intestinal. General characteristics of the type. Variety of coelenterates, their significance.

Freshwater hydra. External and internal structure. Beam symmetry. Hydra food.

Breath. Regeneration. Reproduction.

Type Flatworms. General characteristics of the type. White (milk) planaria.

Liver fluke. External and internal structure. adaptations for parasitism. development cycle. Prevention measures.

Bull tapeworm. parasitic lifestyle. Features of the external and internal structure. development cycle. Protection from infection.

Type Roundworms. General characteristics of the type. The human roundworm is a human parasite.

Reproduction and development of roundworm. development cycle. Measures to prevent infection.

Type Annelids. General characteristics of the type. Earthworm. Habitat. External and internal structure. Organ systems. Reproduction. Regeneration. Importance of earthworms in soil formation.

Mollusk type. General characteristics of the type. A variety of mollusks (toothless, large pond snail, grape snail, slugs, oyster). Their significance in nature and human life.

Type Arthropods. General characteristics of the type.

Class Arachnids. Habitat. The external and internal structure of the Cross Spider.

Respiration, nutrition, reproduction.

Ticks.Structural features. Taiga tick-carrier of encephalitis virus. The role of ticks in nature and their medical significance. Measures to protect people from ticks.

Class Insects. The external and internal structure of the insect on the example of the cockchafer.

Life features. Reproduction.

Types of development of insects. Variety of insects and their importance. Order Lepidoptera.

Silkworm. Sericulture. Detachment Diptera. House fly. Detachment

Hymenoptera. Honey bee.

Type Chordates. General characteristics of the type.

Lancelet as a form close to the ancestors of vertebrates. Habitat. Features of the structure of the lancelet, as the lowest chordate.

Pisces class. General characteristics of the class. The external and internal structure of fish on the example of river perch. Reproduction and development.

Variety of fish: cartilaginous and bone. Economic importance and protection of fish.

Class Amphibians. General characteristics of the class. The external and internal structure of the frog.

Habitat. Reproduction and development. Diversity of amphibians.

Class Reptiles. General characteristics of the class.

The external and internal structure of the lizard fast. Reproduction. Regeneration. Variety of reptiles.

Bird class. General characteristics of the class.

The external and internal structure of the dove. Flight fitness. Features of life processes. Reproduction and development. The role of birds in nature and human life. Bird protection.

Class Mammals. General characteristics of the class. Features of the external and internal structure of mammals on the example of a domestic dog. Reproduction and development.

First of all. marsupials. Placental mammals are the most progressive group of modern vertebrates. Their variety. The importance of mammals in nature and human life. Protection of useful and rare animals.

MAN AND HIS HEALTH

Anatomy, physiology and human hygiene are interrelated sciences that study the structure, functions of the body and the conditions for maintaining its health. The value of knowledge of human anatomy, physiology and hygiene.

General overview of the human body. Man and the environment. Natural and social human environment. Protecting the human environment. General information about the human body. The place of man in the system of the organic world. Similarities and differences between humans and animals. The structure of the human body: cells, tissues, organs, organ systems. Methods for studying the human body.

The main types of tissues (epithelial, connective, muscle, nervous), their structure and functions.

Musculoskeletal system.

Functions of the musculoskeletal system. The structure of the human skeleton. Features of its structure in connection with bipedalism and labor activity. Structure and composition of bones. Bone growth. Bone connections. First aid for fractures, dislocations and sprains.

Muscles, their structure and functions. The main muscle groups of the human body. Muscle work. Influence of rhythm and load on muscle performance. Fatigue. The reflex nature of muscle activity. The value of physical education and sports for the proper formation of the skeleton and muscles. Prevention of curvature of the spine and the development of flat feet. Proper seating, posture and working posture. Injury prevention. The value of physical exercise and work culture for the formation of the skeleton and muscles. First aid for injuries of the musculoskeletal system.The internal environment of the body: blood, tissue fluid and lymph.

The relative constancy of the internal environment of the body.

Blood, blood functions. Composition of blood: plasma, formed elements.

Erythrocytes. The role of erythrocytes in the transfer of gases. Anemia.

Leukocytes. Structure and functions. The teachings of I.I. Mechnikov about the protective properties of blood.

Infectious agents: bacteria and viruses. AIDS. Fight against epidemics.

Immunity and its types. Preventive vaccinations. Therapeutic serums.

Blood coagulation as a protective reaction of the body. Phases of blood coagulation. First aid for bleeding.

Blood groups. Blood transfusion and its importance. Donation.

Circulatory system: heart and blood vessels (arteries, capillaries and veins). Large and small circles of blood circulation. The movement of blood through the vessels. Heart, its structure and work. The concept of nervous and humoral regulation of the heart and blood vessels. Cardiac cycle. Blood pressure and pulse. Heart training. Influence of physical culture and sports on the cardiovascular system. The harmful effects of smoking and alcohol on the heart and blood vessels.

Breath. The structure and functions of the respiratory system. Breathing regulation. Gas exchange in the lungs and tissues.

Voice apparatus.

Breathing movements. Vital capacity and other respiratory volumes.

Respiratory hygiene. Importance of correct breathing. Respiratory diseases and their prevention. First aid techniques for carbon monoxide poisoning, rescuing a drowning person. Transmission of infectious diseases (influenza, tuberculosis, diphtheria, Covid-19) through the air and their prevention. Harm of smoking.

Digestion. Structure and functions of the digestive system. Digestion regulation. Oral cavity. Teeth, their structure and functions. Prevention of dental diseases.

Digestive enzymes in various parts of the digestive system. Changing food in different parts of the digestive tract.

The role of the liver and pancreas in digestion. Suction.

Hygienic conditions for normal digestion Disorders of the digestive system and their prevention. Prevention of helminthic and gastrointestinal diseases, food poisoning, first aid for them. Effects of smoking and alcohol consumption on digestion.

Works by I.P. Pavlov on the study of digestion.

Vitamins. The value of vitamins. Diseases associated with a lack of vitamins in food.

Ways to preserve vitamins in foods.

Selection.

The structure and functions of the excretory system. Mechanisms for the formation of urine. The value of excretion of end products of metabolism from the body. Diseases of the urinary system and their prevention.

Body covers. The structure and functions of the skin. The role of the skin in thermoregulation. Skin, hair, nail care. Hardening of the body. First aid for frostbite, burns, heat and sunstroke. Hygiene of skin, clothing and footwear.

Nervous system. Structure Structure and functions of the nervous system. Central nervous system. Parts of the brain: oblong, middle, intermediate, anterior, cerebellum. The cerebral cortex. The structure and function of the spinal cord. Reflex arc. Peripheral nervous system. The role of the autonomic nervous system in the regulation of internal organs. The doctrine of higher nervous activity. Conditioned and unconditioned reflexes. Image Violations of vision and hearing, their prevention. ing and inhibition of conditioned reflexes. Effect of nicotine, alcohol and drugs on the nervous system.

Sense organs (analyzers).

The structure and functions of the organs of vision and hearing.

Visual analyzer. The structure of the eye. Vision hygiene.

Auditory analyzer. The structure of the organ of hearing. Hearing hygiene. Violations of vision and hearing, their prevention.

Vestibular apparatus. Muscular and skin sensations. Smell. Taste.

Neurohumoral regulation of vital processes of the organism.

Endocrine glands. Functions of the endocrine glands Hormones, mechanisms of their action on cells and significance for the body. The role of humoral regulation in the body. Violations of the nervous and endocrine systems and their prevention.

GENERAL BIOLOGY.

General biology is a subject about the basic and common patterns of life phenomena for all organisms. The value of general biology for medicine, agriculture, forestry and other sectors of the national economy.

General biological patterns. hallmarks of the living. Levels of organization of living matter. Methods of biological research.

evolutionary doctrine.

Brief information about the pre-Darwinian period in the development of biology. The main provisions of the evolutionary teachings of Ch. Darwin. The value of teaching for the development of natural science. View. View criteria. A population is a unit of species and evolution. driving forces of evolution. Heredity. Variability, types of variability. Natural selection. The leading role of natural selection in evolution. The struggle for existence and its forms.

Artificial selection and hereditary variability are the basis for the breeding of domestic animal breeds and varieties of cultivated plants.

The adaptive nature of evolution. relative expediency.

Microevolution. Speciation. Macroevolution.

Results of evolution: organic expediency, adaptability of organisms, diversity.

Development of the organic world.

Origin and development of life on Earth.

The main directions of evolution. Aromorphosis. Idioadaptation. General degeneration. The ratio of different directions of evolution. Biological progress and regress.

Brief history of the development of the organic world. The main aromorphoses in the evolution of the organic world.

Human Origins.

C. Darwin on the origin of man from animals. F. Engels on the role of labor in the process of transformation of ancient monkeys into humans.Driving forces of anthropogenesis: social and biological factors. The role of biological and social factors in human evolution.

Ancient people, ancient people, fossil people of the modern type.

The unity of the origin of the human races. Anti-scientific, reactionary essence of "social Darwinism" and racism.

Ecology.

The subject and tasks of ecology. Environmental factors: abiotic, biotic, anthropogenic, their impact on the body. The environment is a source of substances, energy and information. Influence of ecological factors on organisms. Ecosystem organization of wildlife. Interactions of different species in an ecosystem (competition, predation, symbiosis, parasitism). Food connections in an ecosystem. The cycle of matter and the transformation of energy.

Photoperiodism.

Biogeocenosis. Diversity of populations in biogeocenosis and their interrelations. Food chains. Ecological pyramid rule. Self-regulation. At BGC. Changes in biogeocenoses. Change of biogeocenoses.

Agrocenoses. Protection of biogeocenoses.

The doctrine of the biosphere.

The biosphere is a global ecosystem Teachings of V.I. Vernadsky about the biosphere. Biosphere and its boundaries. Noosphere. Distribution and role of living matter in the biosphere. density of

life. Biomass of land surface, soil, oceans. Living matter, its gas, concentration and redox functions. Circulation of matter and energy in the biosphere. The role of man in the biosphere. Ecological problems. Consequences of human activities in ecosystems.

Fundamentals of Cytology

A cell is an elementary living system that underlies the structure and development of organisms.

Basic provisions of the cell theory.Prokaryotic and eukaryotic cells.

The structure and functions of the nucleus. Chromosomes.

The structure and functions of the cytoplasmic membrane.

Cytoplasm, cell organelles (one-, two- and non-membrane), their structure and functions.

The chemical organization of the cell. The content of chemical elements in the cell (macro, micro and ultramicro). Water and other inorganic substances and their role in the life of the cell.

Organic substances: carbohydrates, lipids, proteins, nucleic acids, ATP and their role in the cell. Enzymes, their role in the regulation of vital processes. DNA duplication. Metabolism and energy in the cell. Plastic and energy metabolism is the basis of cell vital activity. Energy metabolism, its essence, the value of ATP. plastic exchange. Photosynthesis. protein biosynthesis.

Gene and its role in protein biosynthesis. DNA code. Matrix synthesis reactions. Relationship between the processes of plastic and energy metabolism.

Viruses. Their structure, meaning and role in nature. Viral diseases of humans, animals and plants. AIDS virus. AIDS.

Reproduction and individual development of organisms. Cell division is the basis of reproduction and individual development of organisms. Chromosomes, their haploid and diploid set, constancy of number and shape. Preparation of the cell for division. duplication of DNA molecules. Mitosis. phases of mitosis. Meiosis. phases of meiosis.

Sexual and asexual reproduction of organisms. sex cells. The development of eggs and sperm. Fertilization.

Individual development of organisms. Development of a fertilized egg (on the example of a lancelet). Postembryonic development. The harmful effects of alcohol, nicotine and drugs on the development of the human body.

Fundamentals of genetics

Genetics is the science of the laws of heredity and variability. The meaning of genetics. Subject, tasks and methods of genetics.Genetic terms: gene, allelic and non-allelic genes, homo- and heterozygotes, dominant and recessive traits, genotype and phenotype.

The main patterns of transmission of hereditary traits. Hybridological method of studying heredity. Patterns of inheritance established by G. Mendel. Monohybrid cross. The first law of G. Mendel. Uniformity of hybrids of the first generation.

Mendel's second law. splitting law. incomplete dominance. Intermediate type of trait inheritance. Analyzing cross.

Dihybrid cross. The third law of G. Mendel. Independent inheritance of traits in dihybrid crosses. Statistical nature of G. Mendel's laws.

Linked inheritance. Clutch groups. Clutch failure. Crossover of chromosomes.

Chromosomal theory of heredity T. Morgan.

The genotype as an integral system. Interaction of genes.

Sex genetics. Sex chromosomes and autosomes. Sex-linked inheritance.

Change and its forms. modification variability. reaction rate. Statistical patterns of modification variability.

Genotypic variability. Mutations and their causes. Experimental obtaining of mutations. Mutations as material for artificial and natural selection. Pollution of the natural environment with mutagens and its consequences.

The law of homological series in hereditary variability NI Vavilova.

The value of genetics for medicine and public health. The harmful effects of nicotine, alcohol and drugs on heredity.