

VITEEE – 2015 - Syllabus

BIOLOGY

1. Taxonomy

Linnaean system of classification and Binomial nomenclature; history and types of classification; status of bacteria and viruses; classification of angiosperms up to sub-class level (Bentham and Hooker' systems); salient features of non-chordates up to phyla levels and chordates up to class levels.

2. Evolution

Modern concepts of organic evolution, evidences of organic evolution (Fossil records and biochemical evidences). Darwinism and neo – Darwinism, Lamarckism, Neo-Lamarckism, sources of variation, mutation, recombination, gene flow - genetic drift, migration, natural selection. Origin and concepts of species: speciation and isolation (geographical pre-mating and post-mating or post zygotic), adaptive radiations; human evolution.

3. Cell and Molecular Biology

Discovery of cell, cell as a contained unit, pro and eukaryotic cells and its ultra structure. Cell division: amitosis, mitosis and meiosis. The cell: cell wall, cell membrane and cell organelles (Plastids, mitochondria, endoplasmic reticulum, Golgi bodies, ribosomes, lysosomes, vacuoles and centrioles)

DNA and RNA, DNA as genetic material, RNA as genetic material, replication, transcription, genetic code, translation, splicing, gene expression and regulation, protein synthesis, DNA repair.

4. Reproduction

Reproduction in Plants: asexual and sexual reproduction, vegetative propagation, sexual reproduction in flowering plants, structure of flowers, pollination , fertilization, development of seeds and fruits, apomixes and poly-embryony

Human reproduction and Reproductive health: reproductive system in male and female, menstrual cycles, production of gametes, fertilization, implantation, embryo development, pregnancy, parturition and lactation, Assisted reproductive technologies.

5. Genetics

Chromosomes: structure and types, linkage and crossing over, recombination of chromosomes, mutation, chromosomal aberration, Mendelian inheritance, chromosomal theory of inheritance, deviation from Mendelian ratio (gene interaction, incomplete dominance, co-dominance, complimentary gene, multiple allelism), sex determination in humans, chromosomal disorders in humans.

6. Microbiology and Immunology

Introduction to microbial diversity, history of medical microbiology, discovery of antibiotics, pasteurization, microscopes. Fungi, bacteria, virus, protozoa, algae – beneficial and harmful. Parasites and pathogens. Structure of microbes and diseases caused by them. Basic concepts of immunology: Innate and humoral immunity, lymphoid organs, lymph nodes and spleen, antibodies, vaccines, transplantation immunology, immune system disorders.

7. Biochemistry

Structure and function of carbohydrates, lipids, proteins. Disaccharide, starch, glycogen, fats, cholesterol, amino acids, peptides. Primary, Secondary and Tertiary structure of proteins. Enzymes, structure and mechanism of enzyme catalysis, specificity of enzymes, co factors and co-enzymes.

8. Physiology: Plant and Human

Plant Physiology: Movement of water, food, nutrients, gases and minerals. Respiration, photosynthesis (light and dark reactions), Factors affecting photosynthesis, electron transport chain (ETC), glycolysis, Krebs's cycle, pentose phosphate pathway, hormones and growth regulators, Photo-periodism and vernalization.

Human Physiology: Digestion and absorption, breathing and respiration, body fluids and circulation, excretory system, endocrine system, nervous system, skeletal and muscular systems: locomotion, and movement, growth, aging and death. Hormones; types of hormones and its functions.

9. Biotechnology and its applications

Recombinant DNA technology, applications in health, agriculture and industries; genetically modified organisms; bio-safety issues, insulin and Bt cotton, transgenic plants and microbes, plant tissue culture and its application; plant growth regulators; Microbes in food processing; industrial production of microbial products, Sewage treatment, waste management and energy generation.

10. Biodiversity, ecology, and environment

Ecosystems: components, types and energy flow in ecosystem; species, population and community, ecological adaptations, centers of diversity and conservation of bio-diversity, Red data book, botanical gardens, national parks, sanctuaries and museums, environmental issues, human population explosion, green house effects, ozone layer depletion, Environmental issues and Pollution control.

11. Applied biology and human welfare

Bio-pesticides, genetically modified foods, bio-war, bio-piracy, bio-pattern, sustainable agriculture and medicinal plants, economic important plants (food crops, oil seeds, fiber yielding, sugar crops and timber yielding), bio-pharming, pesticides, organic agriculture. Population and birth control, contraception and MTP, sexually transmitted diseases, infertility, cancer and AIDS. Adolescence and drug/or alcohol abuse.