

BIOLOGY

BOTANY

UNIT 1: Diversity in Living World

1. What is living?; Biodiversity; Need for classification; Three domains of life; Taxonomy & Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy – Museums, Zoos, Herbaria, Botanical gardens.

2. Five kingdom classification;

Salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids.

3. Salient features and classification of plants into major groups-Algae,

Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (three to five salient and distinguishing features and at least two examples of each category);

Angiosperms- classification up to class, characteristic features and examples).

4. Salient features and classification of animals-nonchordate up to phyla level and chordate up to class level (three to five salient features and at least two examples).

UNIT 2: Structural Organisation in Animals and Plants

1. Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence- cymose and racemose, flower, fruit and seed (To be dealt along with the relevant practical of the Practical Syllabus).

2 Animal tissues; Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only)

UNIT 3: Cell Structure and Function

1 Cell theory and cell as the basic unit of life: Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles-structure and function; Endomembrane system-endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; Cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); Nucleus-nuclear membrane, chromatin, nucleolus.

2 Chemical constituents of living cells: Biomolecules-structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes-types, properties, enzyme action.

3 B Cell division: Cell cycle, mitosis, meiosis and their significance.

UNIT 4: Plant Physiology

Photosynthesis: Photosynthesis as a means of Autotrophic nutrition; Site of photosynthesis take place; pigments involved in Photosynthesis (Elementary idea); Photochemical and biosynthetic phases of photosynthesis; Cyclic and non cyclic and photophosphorylation; Chemiosmotic hypothesis; Photorespiration C3 and C4 pathways; Factors affecting photosynthesis.

Respiration: Exchange gases; Cellular respiration-glycolysis, fermentation (anaerobic),

TCA cycle and electron transport system (aerobic); Energy relations-Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.

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UNIT 5: Human Physiology

Breathing and Respiration: Respiratory organs in animals; Respiratory system in humans; Mechanism of breathing and its regulation in humans-Exchange of gases, transport of gases and regulation of respiration Respiratory volumes; Disorders related to respiration-Asthma, Emphysema, Occupational respiratory disorders.

Body fluids and circulation: composition of blood, blood groups, coagulation of blood; composition of lymph and its function; Human circulatory system-structure of human heart and blood vessels; cardiac cycle, cardiac output. E.C. Double circulation; Regulation of cardiac activity; Disorders of circulatory system-Hypertension, coronary artery disease, Angina pectoris, Heart failure.

Excretory products and their elimination: Modes of excretion- Ammonotelism, ureotelism, uricotelism; Human excretory system-structure and function; Urine formation, osmoregulation; Regulation of kidney function-Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion; Disorders; Uraemia, Renal failure, Renal calcium, Nephritis; Dialysis and artificial kidney.

Locomotion and Movement: Types of movement- ciliary, fibreglass, muscular; Skeletal muscle- contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of practical syllabus); Joints; Disorders of muscular and skeletal system-Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

Neural control and coordination: Neuron and nerves; Nervous system in humans, central nervous system, peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Chemical coordination and regulation: Endocrine glands and hormones; Human endocrine system-Hypothalamus, pituitary, pineal, Thyroid, parathyroid, Adrenal, Pancreas, Gonads; of hormone of hormone action (Elementary idea); Role of hormones as messengers and regulators, Hypo- and hyperactivity and related disorders (common disorders e.g. Dwarfism, Acromegaly, Cretinism, goitre, exophthalmic goitre, diabetes, Addison's disease). (Imp: Diseases and disorders mentioned above to be dealt in brief.)

UNIT 6: Reproduction

Sexual reproduction in flowering plants: Flower structure; Development of male and female gametophytes; Pollination-types, agencies and examples; Outbreeding devices; Pollen-Pistil interaction; Double fertilisation; Post fertilisation events- Development of endosperm and embryo, Development of seed and formation of fruit; Special modes apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation.

Human Reproduction: Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis-spermatogenesis & oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation: Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).

Reproductive health: Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control-Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; infertility and assisted reproductive technologies - IVF, ZIFT, GIFT (Elementary idea for general awareness).

UNIT 7: Genetics and Evolution

Heredity and variation: Mendelian inheritance; Deviations from Mendelism Incomplete dominance, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Sex determination-I-n humans' birds, honey bee; Linkage and crossing over; Sex linked inheritance-Haemophilia colour blindness; Mendelian disorders in humans-Thalassemia; chromosomal disorders in humans; Down's syndrome, Tumer's and Klinefelter's syndromes.

Molecular basis of Inheritance: Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, genetic code, translation; Gene expression and regulation- Lac Operon; Genome and human genome project; DNA finger printing, protein biosynthesis.

Evolution: Origin of life; Biological evolution and evidences for biological evolution from Paleontology, comparative anatomy, embryology and molecular evidence); Darwin,s contribution, Modern Synthetic theory of Evolution; Mechanism of evolution Variation (Mutation and Recombination) and Natural Selection with examples, types of natural selection; gene flow and genetic drift; Hardy-weinberg's principle; Adaptive Radiation; Human evolution.

UNIT 8: Biology and Human Welfare

1. Health and Disease; Pathogens; Parasites causing human diseases (Malaria, Filariasis, Ascariasis. Typhoid, Pneumonia, common cold, amoebiasis, ringworm); Basic concepts of immunology-vaccines; Cancer, HIV and AIDS; Adolescence, drug and alcohol abuse.

2.Improvement in food production; Plant breeding, tissue culture, single cell protein, Biofortification; Apiculture and Animal husbandry.

3. Microbes in human welfare: In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilisers.

UNIT 10: Ecology and Environment

Organisms and environment Population, interactions-mutualism, competition..predation, parasitism Population attributes-growth. birth rate and death rate, age distribution.

Ecosystem: Patterns, components; productivity and decomposition: Energy flow: Pyramids of numbers, biomass. energy

Biodiversity and its conservation: concept of Biodiversity; patterns of Biodiversity:

Importance of Biodiversity; Loss of Biodiversity Biodiversity conservation; Hotspots, endangered organisms. extinction; Red Data Book. biosphere reserves, National parks and sanctuaries, Sacred Groves.

