BOTANY

UNIT – 1

Diversity in living world:

1. What is living? Biodiversity, Need for classification. Three domains of life. Taxonomy & systematic concepts of species and taxonomical hierarchy. Binomial nomenclature tools for study of Taxonomy, Herbaria, Botanical gardens.

2. Five kingdom classifications, Silent features and classification of Monera,Protista and Fuji into major groups.

3. Salient features and classification of plants into major groups. Algae (spirogyra) Bryophytes (Funenia), Ptenidophytes (Pteris), Gymnosperms (Cycas).

UNIT - 2

External morphology:

Root, Stem, Leaf, Inflorescence, Flower, Fruit and Seed.

UNIT - 3

Internal Morphology:

1. **Histology:** Meristems, Simple tissues, Complex tissues and special tissues.
2. **Tissue System:** Epidermal, Ground and Vascular tissue systems.
3. **Anatomy:** Anatomy of Dicot and monocot root, dicot and monocot stem, dicoct and monocot leaf, secondary growth in dicot stem and dicot root.

UNIT - 4

Cell Biology:

1. Cell theory and cell as the basic unit of life. Structure of prokaryotic and eukaryotic cell, plant and animal cell. Cell wall, cell membrane, cell organelles structure and function 1 chromosomes.
2. Biomolecules: Structure and function of proteins, carbohydrates, lipids, nucleic acids, enzymes.
3. Cell division: Cell cycle, Mitosis and meiosis.

UNIT - 5

Plant Taxonomy:
Introduction: Principles of plant classification, brief account of Bentham & Hooker's system.
Families: Fabaceae, Asteraceae, Solenacrae, Liliaceae poaceae.

UNIT - 6

Reproduction:
1. Reproduction organisms, Modes of reproduction. Asexual and sexual. Asexual regproduction – Binary fission, Sporulation, Budding, gemmule, Fragmentation, Vegetative propagation in plants.
2. Sexual reproduction flowering plants. Development of male and female gametophytes. Pollination types, agents. Out breeding devices, Double fertilization, post fertilization changes. Development of endosperm, embryo and seed. Apomixis, parthenocerpy, polyembryony.

UNIT - 7

Microbiology:
1. Bacteria and Viruses
2. Microbes in human welfare**:** In household food processing, industrial production, sewage treatment , energy generation and as biocontrol agents and biofertilizers.

UNIT - 8

Human welfare:

Improvement in food production. Plant breeding, tissue culture, single cell protein, Mushroom cultivation, Biofortification.

UNIT - 9

Biotechnology and its applications:
1. Principles and process of Biotechnology, Genetic engineering.
2. Application of Biotechnology in Agriculture and health. Human insulin and vaccine production, genetherapy, Genetically modified organisms, Bt. Crops, Trasgeric animals, Biosafety issues - Biopiracy and patents.

UNIT - 10

Plant Physiology:

1. **Transport in plants:** Movement of water, gases and nutrients; cell to cell transport – Diffusion, facilitated diffusion, active transport; plant-water relations – Imbibition, water potential, osmosis, plasmolysis; Long distance transport of water – Absorption, apoplast, symplast, transpiration pull, root pressure and guttation. Transpiration – Opening and closing of stomata; Uptake and translocation of mineral nutrients – Transport of food, phloem transport, Mass flow hypothesis; Diffusion of gases (Brief mention).

2. **Mineral nutrition:** Essential minerals, macro and micronutrients and their role; Deficiency symptoms: Mineral Toxicity; Elementary idea of Hydroponics as a method to study mineral nutrition; Nitrogen metabolism; Nitrogen cycle, biological nitrogen fixation.

3. **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;

4. Factors affecting photosynthesis.

5. **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.

6. **Plant growth and development :** Seed germination; Phases of plant growth and plant growth rate; Conditions of growth; Differentiation, dedifferentiation and redifferentiation ; Sequence of developmental process in a plant cell; Growth regulators – auxin, gibberellin, cytokinin, ethylene, ABA; Seed dormancy; Vernalisation; Photoperiodism.

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Zoology

UNIT - 1

Animal Classification:

1. Salient features (3 to 5) and two examples of Non-chordate phyla.
2. Salient features (3 to 5) and two examples of chordate classes.

UNIT - 2

Structural Organisation in animals:

1. **Cockroach:** Brief account of morphology, anatomy and functions of digestive circulatory, respiratory, nervous and reproductive systems.
2. **Animal tissues:** Epithelial, connective, muscular and nervous tissues.

UNIT - 3

Human Physiology-Digestive and Respiratory systems:

1. Digestive System : Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; caloric value of proteins, carbohydrates and fats; Egestion; Nutritional and digestive disorders-PEM, indigestion, constipation, vomiting, Jaundice, diarrhea.
2. Respiratory system: Respiratory organs in animals (recall only); 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 respiration-Asthma Emphysema, Occupational respiratory disorders.

UNIT - 4

Human Physiology: **Circulatory and Excretory Systems:**

1. **Circulatory System:** 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, ECG, Double circulation; Regulation of Cardiac activity, Disorders of circulatory system – Hypertension, Coronary artery disease, Angina pectoris, Heart failure.

2. **Excretory System :** Modes of Excretion – Ammonotelism, ureotelism, Uricotelism; Human excretory system – Structures 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; Uremia, Renal Failure, Renal calculi, Nephritis; Dialysis and artificial Kidney.

UNIT - 5

Human Physiology–Locomotion & Movement and Neuro Endocrine System:

1. **Locomotion and Movement:** Types of movement – ciliary, Flagellor, muscular; Skeletal muscle – Contractile proteins muscle contraction; Disorder of muscles. Myasthenia gravis, Tetany, Muscular distrophy.

2. **Skeletal System and its functions**: joints; Disorders of skeletal system – Osteoporosis, Arthritis, Gout.

3. **Nervous System:** Neurons and nerves; Nervous system in humans – central nervous system, Peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sense organs: Elementary structure and function of eye and ear.

4. **Endocrine System:** Endocrine glands and hormones; Human endocrine system – Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary idea); Role of hormones as messengers and regulators, Hypo and hyperactivity and related disorders(e.g. Dwarfism, Acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease).

UNIT - 6

Human Physiology – Reproduction:

1. **Human Reproduction:** Male and Female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis – Spermatogenesis & oogenesis; Menstrual Cycle; Fertilization, Embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).

2. **Reproductive Health:** Need for reproductive health and prevention of sexually transmitted diseases (STDs); 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:

1) **Heredity and Variations:** Mendelian Inheritance; Deviation 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 – In humans, birds, honey bee; Linkage and crossing over; Sex linked inheritance – Hemophilia, Colourblindness; mendelian disorders in humans – Thalassemia; Chromosomal disorders in humans – Down's syndrome, Turner's and Klinefelter's Syndromes.

2) **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.

3) **Evolution:** Origin of life; Biological evolution and evidences for biological evolution from Paleontology, comparative anatomy, embryology and molecular, e**vidence** - 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

Human Health and Diseases:

1) Pathogens; Parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid Pneumonia, Common Cold, Amoebiasis, Ringworm).

2) Basic concepts of immunology – Vaccines; Cancer, HIV and AIDS.

3) Adolescence, Drug and alcohol abuse.

UNIT - 9

Ecology and Environment:

1) **Organisms and environment :** Habitat and niche; Population and Ecological adaptations; Population Interactions – Mutualism, Competition, Predation, Parasitism; Population attributes – Growth, birth rate and death rate, age distribution.

2) **Ecosystem:** Patterns, Components; Productivity and decomposition; Energy flow; Pyramids of numbers, biomass, energy, Nutrient cycling (carbon and phosphorous); Ecological succession; plant communities; Ecological services – carbon fixation, pollination, oxygen release.

3) **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.

4) **Environmental issues:** Air pollution and its control; Water pollution and its control; Agrochemicals and their effects; Solid waste management; Radioactive Waste management; Greenhouse effect and global warming; Ozone depletion; Deforestation; Any three case studies as success stories addressing environmental issues.

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