

BIOLOGY/BIOLOGICAL STUDIES/BIOTECHNOLOGY/ BIOCHEMISTRY

Unit I: Reproduction

Reproduction in Organisms: Reproduction, A Characteristic Feature of All Organisms for Continuation of Species; Modes of Reproduction: Asexual and Sexual; Asexual Reproduction; Modes-Binary Fission, Sporulation, Budding, Gemmule, Fragmentation; Vegetative Propagation in Plants

Sexual Reproduction in Flowering Plants: Flower Structure; Development of Male and Female Gametophytes; Pollination–Types, Agencies, and Examples; Outbreeding's Devices; Pollen-Pistil Interaction; Double Fertilisation; Post-fertilization 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 up to 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, IUI, ZIFT, GIFT (Elementary Idea for General Awareness)

Unit II: 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 in Humans, Birds, Honeybee; Link Age and Crossing Over; Sex-linked inheritance: Haemophilia, Colour Blindness; Mendelian Disorders in Humans: Thalassaemia; Chromosomal Disorders in Humans: Down's Syndrome, Turner'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 Fingerprinting

Evolution: Origin of Life; Biological Evolution and Evidences for Biological Evolution (Paleontological, 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 III: Biology and Human Welfare

Health and Disease: Pathogens; Parasites causing Human Diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, Common Cold, Amoebiasis, Ring Worm); Basic Concepts of Immunology–Vaccines; Cancer, HIV and AIDs; Adolescence, Drug and Alcohol Abuse

Improvement in Food Production: Plant Breeding, Tissue Culture, Single Cell Protein, Biofortification; Apiculture and Animal Husbandry

Microbes in human welfare: In Household Food Processing, Industrial Production, Sewage Treatment, Energy Generation and as Bio Control Agents and Biofertilizers

Unit IV: Biotechnology and Its Applications

Principles and Process of Biotechnology: Genetic Engineering (Recombinant DNA Technology).

Application of Biotechnology in Health and Agriculture: Human Insulin and Vaccine Production, Gene Therapy; Genetically-modified Organisms; BT crops; Transgenic Animals; Biosafety Issues: Biopiracy, Patents

Unit V: Ecology and environment

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

Ecosystems: Patterns, Components; Productivity and Decomposition; Energy Flow; Pyramids of Number, Biomass, Energy; Nutrient Cycling (Carbon and Phosphorous); Ecological Succession; Ecological Services: Carbon fixation, Pollination, Oxygen Release

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, Bio Sphere Reserves, National Parks and Sanctuaries Sacred Groves, In-situ & Ex-situ.

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