

# Syllabus

## 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 devices, Pollen-Pistil interaction, Double fertilization, 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 and 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 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, honey bee, Linkage and crossing over, Sex linked inheritance—Haemophilia, Colour blindness, Mendelian disorders in humans—Thalassemia, 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 finger printing.

**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 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 biocontrol agents and biofertilizers.

## UNIT IV Biotechnology and Its Applications

**Principles and process of Biotechnology** Genetic engineering (Recombinant DNA technology). Applications of Biotechnology in health and agriculture Human insulin and vaccine production, gene therapy, Genetically modified organisms—Bt crops, Transgenic Animals, Biosafety issues—Biopiracy and 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.

**Ecosystem** 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, biosphere reserves, National parks and sanctuaries.

**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.