SYLLABUS FOR COMMON ENTRANCE TEST
Integrated BSc-MSc Botany (North Campus, University of Kashmir)
Session 2023-24

The syllabus has been prepared after consulting CUET, CBSE and JK BOSE syllabi.

Unit I: Structural Organization in Animals and Plants

1. Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence- cymose and recemose, flower, fruit and seed.
2. Animal tissues; Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach).

Unit II: 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, micro bodies; Cytoskeleton, cilia, flagella, centrioles (ultra structure 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, enzymeaction.
3. Cell division: Cell cycle, mitosis, meiosis and their significance.

Unit III: Plant Physiology

1. **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.
2. **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.
3. **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.

Unit IV: Reproduction

1. **Reproduction in organisms:** Modes of reproduction – Asexual and sexual; Asexual reproduction; Modes- Binary fission, sporulation, budding, gemmule, fragmentation; vegetative propagation in plants, micro-propagation.
2. **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.

3. **Human Reproduction:** Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis- spermatogenesis & oogenesis; Menstrual cycle; Fertilization, embryo development up-to blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).
4. **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 V: Genetics and Evolution

1. **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; 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.
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 fingerprinting.
3. **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 VI: Biology and Human Welfare

1. **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.
2. **Improvement in food production:** Plant breeding, inbreeding depression (basic idea), single cell protein, Bio-fortification; Apiculture and Animal husbandry.
3. **Microbes in human welfare:** In house hold food processing, industrial production, sewage treatment, energy generation-biogas and as bio-control agents and biofertilizers. Over-view of Corona Virus, DNA & RNA viruses, concept of viroid, virion and prions.

Unit VII: Biotechnology and its Applications

1. **Principles and process of Biotechnology:** Genetic engineering (Recombinant DNA technology); tools of rDNA technology, vectors-plasmid, phage, BAC, YAC, animal and plant viral vectors.
2. Restriction Enzymes, DNA ligase and alkaline phosphatase, introduction of recombinant NA into host cells, PCR.
3. **Application of Biotechnology in health and agriculture:** Human insulin and vaccine production,

gene therapy; genetically modified organisms- Bt crops; Transgenic Animals; Bio-safety issues- Biopiracy and patents; *Agrobacterium*-mediated transformation, crown gall disease in plants.

4. **Plant tissue culture:** cellular totipotency, technique and application of tissue culture.

Unit VIII: 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. **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.
3. **Biodiversity and its conservation:** Concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity; Biodiversity conservation; Hotspots, endangered organisms (plants & animals), 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; Some case studies as success stories addressing environmental issues.