UNIVERSITY OF KASHMIR

NAAC ACCREDITED GRADE "A+"

NORTH CAMPUS, DELINA, BARAMULLA (J&K)-193103

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SYLLABUS FOR ENTRANCE TEST

Integrated B. Sc.- M. Sc. Botany (North Campus, University of Kashmir)

Session 2024-25

Unit I: Diversity in Living World:

1. 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

Unit II: Classifications:

1. Salient features and classification of plants into major groups- Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (important distinguishing features and at least two examples of each category); Angiosperms-classification up to class, characteristic features and examples)
2. Salient features and classification of animals-nonchordate upto phyla level and chordate up to classes level (important features and at least two examples)

Unit III: 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 racemose, 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 IV: 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 (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. Cell division: Cell cycle, mitosis, meiosis and their significance

Unit V: Plant Physiology:

1. Mineral nutrition: Essential minerals, macro and micro nutrients 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; 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 VI: Human Physiology-I:

1. Digestion and absorption: Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; Calorific value of proteins, carbohydrates and fats; Egestion; Nutritional and digestive disorders – PEM, indigestion, constipation, vomiting, jaundice, diarrhea.
2. Breathing and Respiration: 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 to respiration- Athma, Emphysema, Occupational respiratory disorders.

Unit VII: Human Physiology-II:

1. Excretory products and their elimination: Modes of excretion- Ammonotelism, ureotelism, uricotelism; Human excretory system-structure and fuction; 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 calculi, Nephritis; Dialysis and artificial kidney.
2. Locomotion and Movement: Types of movement- ciliary, flagellar, 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.

Unit VIII: Reproduction in Plants:

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

Unit IX: Reproduction in Ainamls:

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1. 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).
2. 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 X: Genetics:

1. Heredity and variation: Mendelian Inheritance; Deviations from Mentalism- 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- Hemophilia, 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

Unit XI: Biology and Human Welfare:

1. Health and Disease: Pathogens; parasites causing human diseases (Malaria, Ascariasis, Typhoid); 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 XII: 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- Bio piracy and patents; Agrobacterium-mediated transformation, crown gall disease in plants.
4. Plant tissue culture: cellular totipotency, Application of tissue culture.

Unit XIII: Ecology and environment:

3. 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.
4. 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.

Unit XIV Biodiversity and Conservation:

1. 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.
2. 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.

XV: Evolution and Origin of Life:

1. Biological evolution and evidences for biological evolution (Paleontological, comparative anatomy, embryology and molecular evidence); Darwin's contribution, Modern Synthetic theory of Evolution
2. 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.

Departmental Committee

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