

**ANDHRA PRADESH**  
**RECRUITMENT OF ASSISTANT PROFESSORS IN THE UNIVERSITY**  
**SYLLABUS FOR THE SCREENING TEST**  
**BIO SCIENCES**  
**SUBJECT CODE - 82**

**The Living World**

Biodiversity: Need for classification; three domains of life; taxonomy and systematics; concept of species and taxonomical hierarchy; binomial nomenclature

**Biological Classification**

Five kingdom classification; Salient features and classification of Monera, Protista and Fungi in to major groups: Lichens, Viruses and Viroids.

**Plant Kingdom**

Classification of plants into major groups: Salient and distinguishing features and a few examples of Algae, Bryophyta, Pteridophyta, Gymnospermae (Topics excluded Angiosperms, Plant Life Cycle and Alternation of Generations)

**Animal Kingdom**

Salient features and classification of animals, non-chordates up to phyla level and chordates up to class level (salient features and at a few examples of each category).

**Morphology of Flowering Plants**

Morphology of different parts of flowering plants: root, stem, leaf, inflorescence, flower, fruit and seed. Description of families: Solanaceae

**Anatomy of Flowering Plants**

Anatomy and functions of tissue systems in dicots and monocots.

**Structural Organization in Animals**

Morphology, Anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of frog.

## **Cell-The Unit of Life**

Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells: Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function; endomembrane system endoplasmic reticulum, ribosomes, golgi bodies, lysosomes, vacuoles; mitochondria, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.

## **Biomolecules**

Chemical constituents of living cells: biomolecules, structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes - properties, enzyme action.

## **Cell Cycle and Cell Division**

Cell cycle, mitosis, meiosis and their significance

## **Photosynthesis in Higher Plants**

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 photophosphorylation; chemiosmotic hypothesis, photorespiration; C3 and C4 pathways; factors affecting photosynthesis.

## **Respiration in Plants**

Exchange of gases; cellular respiration - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations- number of ATP molecules generated; amphibolic pathways; respiratory quotient.

## **Plant Growth and Development**

Seed germination; phases of plant growth and plant growth rate; conditions for growth; differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators auxin, gibberellin, cytokinin, ethylene, ABA. Breathing and Exchange of Gases.

Introduction to respiratory organs in animals; 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 asthma, emphysema, occupational respiratory disorders.

## **Body Fluids and Circulation**

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.

## **Excretory Products and their Elimination**

Modes of excretion ammonotelism, ureotelism, uricotelism; human excretory system structure and function; urine formation, osmoregulation; regulation of kidney function-renin angiotensin, atrial natriuretic factor, ADH, diabetes insipidus; micturition; role of other organs in excretion; disorders uremia, renal failure, renal calculi, nephritis; dialysis and artificial kidney, kidney transplant.

## **Locomotion and Movement**

Types of movement amoeboid, ciliary, flagellar, muscular; skeletal muscle, contractile proteins and muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal systems myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

## **Neural Control and Coordination**

Neuron and nerves; Nervous system in humans' central nervous system and peripheral nervous system; generation and conduction of nerve impulse; visceral nervous system.

## **Chemical Coordination and Integration**

Endocrine glands and hormones; human endocrine system - hypothalamus, pituitary, pineal, thyroid, parathyroid, thymus, adrenal, pancreas, gonads; hormones of heart, kidney and gastrointestinal tract; mechanism of hormone action (elementary idea); role of hormones as messengers and regulators, hypo- and hyperactivity and related disorders; dwarfism, acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease.

## **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 dispersal and fruit formation.

## **Human Reproduction**

Male and female reproductive systems; microscopic anatomy of testis and ovary. gametogenesis spermatogenesis and oogenesis; menstrual cycle; fertilization, embryo development up to blastocyst formation, implantation; pregnancy and placenta formation; parturition; lactation  
Reproductive Health Need for reproductive health and prevention of Sexually Transmitted Diseases (STDs); birth control need and methods; medical termination of pregnancy (MTP); amniocentesis, infertility and assisted reproductive technologies - IVF, ZIFT, GIFT

## **Principles of Inheritance and Variation**

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; linkage and crossing over; Sex determination - in human being, birds and honeybee; 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**

Structure of DNA and RNA; DNA packaging: Search for genetic material and DNA as genetic material; DNA replication; Central Dogma; transcription, genetic code, translation; gene expression and regulation - lac operon; Human genome project: DNA fingerprinting.

## **Evolution**

Origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidences); adaptive radiation; Darwin's 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; human evolution

## **Human Health and Diseases**

Pathogens; parasites causing human diseases (malaria, dengue, chikungunya, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm) and their control; Basic concepts of immunology vaccines; cancer, HIV and AIDS; Adolescence drug and alcohol abuse.

## **Biotechnology Principles and Processes**

Genetic Engineering (Recombinant DNA Technology).

## **Biotechnology and its Application**

Application of biotechnology in health and agriculture: genetically modified organisms - Bt crops; Human insulin, gene therapy; molecular diagnosis; transgenic animals; biosafety issues, biopiracy and patents.

## **Organisms and Populations**

Population interactions mutualism, competition, predation, parasitism, commensalism; population attributes-growth, birth rate and death rate, age distribution.

## **Ecosystem**

Ecosystem, productivity and decomposition; energy flow; pyramids of number, biomass, energy.

## **Biodiversity and Conservation**

Biodiversity Concept, levels, patterns, importance; loss of biodiversity; biodiversity conservation; hotspots, endangered organisms, extinction, Red Data Book, Sacred Groves, biosphere reserves, national parks, wildlife, sanctuaries and Ramsar sites.