

# **BIOLOGY**

## **1- CELL BIOLOGY**

Cell biology. Prokaryotic cell. Eukaryotic cell. Cell membrane. Cell organelles. Cell core. Difference between unicellular and multicellular organisms. Cell cycle/Cell division. Viruses. Bacteria.

## **2- DEVELOPMENTAL BIOLOGY**

Reproduction of animals. Reproductive cells – gametogenesis, oogenesis – origin of egg cell; spermatogenesis – origin of spermatozoa. Fertilization - stages of fertilization. Early stages of embryogenesis and organogenesis. Cleavage - creation of multicellular embryo. Gastrulation – creation of layered embryo. Creation of axial organs – intestinal tubes, notochorda, nerve tubes. Cell differentiation. Fate mapping. Potency of egg cells and determination of development. Embryonic induction. Extraembryonal development - placenta and types of placenta. Ageing. Individual development of the man.

## **3- ANIMAL MORPHOLOGY**

Organs systems in animals. Nervous system Excretory system.. Sense organs. Circulatory system. Respiratory system. Digestive system and food absorption. Endocrine system and humoral regulation. Energy distribution and thermoregulation.

## **4- MOLECULAR BIOLOGY**

Molecular arrangement of the cell. Molecular biology. Nucleic acids – structure and biological role. Proteins – structure and biological role. Genome and gene. DNA replication. Transcription. Genetic code. Translation. Regulation of gene activity. Molecular biotechnology.

## **5- INHERITANCE MECHANISMS**

Inheriting biological features. What is genetics? Inheritance rules. Chromosomal basis of the inheritance. Chromosomes, phenotype and genotype. Basic principles of inheritance. Types of inheritance features in plants and animals. Forms of interaction among genes. Sources of genetic variability. Recombination – recombination of genes and chromosome mapping. Mutation. Chromosome structure changes. Chromosome number changes. Environment mutagenesis. Population genetics. Genetic structure of population. Dynamics of maintaining genetic polymorphism of population. Genetic control of development - Genetic control of developmental processes. Human genetics. Human genome research. Research methods in human genetics. Human chromosomes. Inherited basis of variability in humans. Chromosomopathy - inherited diseases as a consequence of changes in chromosome number and structure. Genetic counseling – early detection of inherited diseases; genetic testing and counseling. Genes and behavior. Genes and mental disorders

## **6- EVOLUTION**

What is evolution? Evolution theory. Contemporary evolution theory. Co-evolution. Genesis of species. Genesis of life. Human evolution.

## **7- ECOLOGY**

Basic concept and principles of ecology. Living conditions – environmental factors. Relation of the organism to the environment; adaptation. Concept of population and its basic traits. Living community biocenosis. Photosynthesis and nutrient relations. Ecosystem.