

SYLLABUS FOR DEET – 2021

UNIVERSITY DEPARTMENT OF ZOOLOGY, VBU

1. **Animal Diversity:** Flagella and ciliary movement in Protozoa, Filter feeding in Polychaeta, Organs of respiration in arthropods, Nephridia and coelomoducts in Annelida, Primitive mammals –Prototheria, Metatheria, Adaptive Radiation in mammals, Dentition in mammals.

2. SYSTEM PHYSIOLOGY -

Blood and circulation - Blood corpuscles, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, haemostasis.

Cardiovascular System: myogenic heart, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above.

Respiratory system - transport of gases, exchange of gases, neural and chemical regulation of respiration.

Nervous system - Neurons, action potential, central and peripheral nervous system.

Sense organs – Vision and hearing.

Excretory system - Kidney, urine formation, urine concentration, waste elimination, micturition, regulation of water balance, electrolyte balance, acid-base balance.

Thermoregulation - Comfort zone, body temperature, acclimatization.

Stress and adaptation

Digestive system - Digestion, absorption, BMR.

3. Basic concepts of Population Genetics, Evolution biosystematics and taxonomy:

Importance and application of biosystematics in biology. Chemotaxonomy, Cytotaxonomy, Molecular taxonomy, Concepts of evolution and theories of organic evolution with emphasis on Darwinism, Neo-Darwinism, and Hardy-Weinberg law of genetic equilibrium, Species concept mechanism of speciation. Reproductive isolation, Gene evolution, Evolution of gene Families.

4. **Biostatistics:** Biostatistics and its applications, Sampling methods, Measures of central tendency, Diagrammatic and graphic presentation of data. Range, Inter quartile range, Mean deviation and standard deviation, Correlation, Regression analysis: Regression lines and regression equations, student t-test, Chi-square analysis.

5. Environmental sciences: Ecosystem: Concept kinds of ecosystem components of ecosystem, Ecological energetic and energy-flow, Food chain, food web, Concept of productivity -primary, secondary, gross and net productivity. Environmental pollution- Definition, global scenario, consequences and significance of ozone layer Greenhouse effect. Population Characteristics and Interaction Competition and Niche theory- Intra-specific and inter-specific competition, Characteristics of community.

Evaluation of biodiversity indices- Shannon-Weinner Index, Dominance Similarity and dissimilarity Index, Association Index. Index.

6. Tools and techniques in biology: Principles and uses calorimeter, spectrophotometer, ultracentrifuge, Microscopy- principle of light microscope, transmission and scanning electron microscope. Molecular separation by chromatography and Gel electrophoresis, Autoradiography, RIA; Blotting techniques: Northern Southern and Western, C-DNA library.

7. Bio Molecules and Structural Biology: Structure and classification of Carbohydrates, Proteins – Structural organisation, Motif and Domain, Protein folding, lipids Biosynthesis of fatty acid, β - oxidation. Enzymes – classification, kinetics. Metabolism of carbohydrates.

8. General and Comparative Endocrinology: Classification of hormones, Pituitary, Pancreas, Adrenal, and Thyroid. Neuroendocrine system and neurosecretion, General principles of hormone action, Hormones and homeostasis, Hormonal control of fuel metabolism: Insulin, Glucagon Epinephrine, Biosynthesis of amino acid derived small size hormone (e-g. T4, Epinephrine) Hormones and Reproduction.

9. Immune system: Innate and Acquired Immunity: Organization and structure of lymphoid organs, Cells of the immune system and their differentiation, Antigen and antibody reaction. Epitopes and haptens, Major Histocompatibility Complex in mouse and HLA system in human, Organization and expression of Ig genes, T-cell, cell generation activation and differentiation, Cytokines: Structure and functions and their receptors, Complement system: Component and functions. Cell adhesion molecules, Hypersensitivity.

10, CELL BIOLOGY: Biomembrane, Molecular organization, Fluid-Mosaic model Transport across the cell membrane, membrane potential, Cell-cycle-Cyclins and CDK Regulation of CDK-cyclin activity, Mitochondria-Structure, Oxidative phosphorylation, Cell Signalling-Nucleus-Structure of Nuclear membrane and nuclear transport, Cytoskeleton, Biology of Chromosome-Ultra structure of Chromatin fibre, programmed cell death, Stem cell a concept, Epigenetic Inheritance e.g., prion disease.

11. INHERITANCE BIOLOGY:

Mendelian principles: Dominance, segregation, independent assortment.

Concept of gene: Allele, multiple alleles, pseudoallele, complementation tests

Extensions of Mendelian principles: Codominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, penetrance and expressivity, phenocopy, linkage and crossing over, sex linkage, sex limited and sex influenced characters.

Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.

Extra chromosomal inheritance: Inheritance of Mitochondrial and chloroplast genes, maternal inheritance.

Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.

Human genetics: Pedigree analysis, lod score for linkage testing, karyotypes, genetic disorders.

Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.

Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, insertional mutagenesis.

Structural and numerical alterations of chromosomes: Deletion, duplication, inversion, translocation, ploidy and their genetic implications.

Recombination: Homologous and non-homologous recombination including transposition.

DNA, RNA-Molecular organization, DNA Replication, Transcription and translation in prokaryotes, Gene regulation Lac operon, Tryptophan operon, the law of DNA constancy C-Value paradox.