DEPARTMENT OF ZOOLOGY (B.Sc Zoology Hons)

PROGRAMME OUTCOME:

1. Aware students about knowledge and skill in the fundamentals and systematics of animal kingdom.
2. Awareness about environment and its conservation processes, pollution control and its importance.
3. Understand various physiological processes of molecular level for animals from different phyla.
4. Gain knowledge of anatomical structure and various metabolic functions of organisms.
5. Understand about various concepts of genetics and its importance in social wellbeing.
6. Gain knowledge of communicable and non-communicable diseases to improve personal and public health.
7. Understanding of economic Zoology such as Sericulture, Apiculture, Aquaculture, Industrial microbiology, rDNA technology and medicine for students career opportunities.

PROGRAMME SPECIFIC OUTCOME:

C.1- Understand the basic of life processes in the non-chordates and recognize the economically important fauna.

C.2- Understanding the various features and aspects of population ecology, community ecology and ecosystem ecology, and gain knowledge about environmental biology in details.

C.3-Understand the diversity,classification and functional aspects of different systems of phylum Annelida, Arthropoda, Mollusca and Echinodermata.

C.4- Knowledge of basic terms in physiology and various physiological processes in mammals.

C.5- Understand the classification, structure and function of different classes of chordates . Also learn some special topics like zoogeography, metamorphosis, snake bites, migration of birds, parental care of amphibian.

C.6 - Understand about basics of histology , tissue staining, physiology of muscles, nerves, reproductive systems , bone and endocrinology with classification of hormones and their biosynthesis.

C.7- Understand the structures of different systems such as, integumentary, skeletal, digestive, respiratory, circulatory, urinogenital, nervous and sensory organs in comparative way among the vertebrate group.

C.8- Understand the basic and fundamental biochemistry of carbohydrates, proteins, lipids , nucleic acids and mechanism of enzyme action.

C.9- Understand the structures and functions of plasma membrane and all cellular organelles in details. Gain knowledge about chromosomes, cell divisions in mitosis and meiosis , cell signalling and cancers.

C.10-Understand the fundamental genetics like Mendelian and Non Mendelian inheritances,linkages,mutations,sexdetermination of various animals and extrachromosomal inheritances.

C.11-Understand different aspects of early, late , post embryonic developments and implications of developmental biology in various fields, such as in teratogenesis, stem cell biology, in vitro fertilization.

C.12- Gain knowledge about replication, transcription, translation, post transcriptional and post translational modifications, gene regulation, DNA repair mechanisms.

C.13- Gain knowledge about structure and function of immune cells, immunoglobulins, antigens and their interactions with antibodies. About MHC molecules, cytokines, hyper sensitivity reactions and cellular mode of immunity development.

C.14- Understand about population genetics, human evolution, various concepts about origin of species and extinctions.

DSE 1- Understand about patterns of animal behaviours, survival strategies, social and cooperative behaviours, design of signals and chronobiology.

DSE 2- Understands concepts of apiculture, sericulture, poultry and dairy farming.

DSE 3- Understand fundamental principles involved in Microbiology. Acquire detail knowledge of microorganisms, their types and significanGce.

DSE 4- Gain knowledge how to write project paper .

COURSE OUTCOME

Core 1- DIVERSITY AND EVOLUTION OF NANCHORDATA

- To understand the Animal diversity around us.
- To understand the underlying principles of classification of animals.
- To understand the terminology needed in classification.
- To understand the differences and similarities in the various aspects of classification.
- To classify invertebrates and understand the possible group of the invertebrate observed in nature.

PRACTICAL

- Morphology of Paramecium, Binary fission and Conjugation in Paramecium.
- Life stages of Plasmodium vivax, Trypanosma gambiense and Entamoeba histolytica (Slides/Micro-photographs).
- Study of Sycon (including T.S. and L.S.), Hyalonema, and Euplectella.
- Fasciola hepatica, Taenia solium and their life stages (slide/microphotograph)
- To study of adult Ascaris lumbricoides, Wuchereria bancrofti and their life stages (slides/microphotographs).

Core-2 INTRODUCTION OF ECOLOGY

- The learners to identify and critically evaluate their own beliefs, values and actions in relation to professional and social standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.
- To understand anticipate, analyze and evaluate natural resource issues and act on a lifestyle that conserves nature.
- The Learner understands and appreciates the diversity of ecosystems , the local lifestyle and

problems of the community.

- The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.
- The working in nature to save environment will help development of leadership skills to promote betterment of environment.

PRACTICAL

- Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided.
- Determination of population density in a natural/hypothetical community by quadrate method and calculation of Shannon-Weiner diversity index for the same community.
- Study of an aquatic ecosystem: fauna and flora Measurement of area, temperature,turbidity/penetration of light, determination of pH, and Dissolved Oxygen content(Winkler's method), Chemical Oxygen Demand and free CO2.
- Report on a visit to National Park/Biodiversity Park/Wildlife sanctuary.

CORE-3 BIOLOGY OF NANCHORDATA II

- Understand the diversity , classification and functional aspects of different systems of phylum-Arthropoda, Mollusca and Echinodermata.
- Describe the social life and economic importance of insects.
- Understand the physiology of pearl formation and pearl oyster formation.
- Describe the advanced characteristic features Mollusca.
- Resemblance and evolutionary significance of larval forms of Echinoderms.

PRACTICAL

- Study of Aphrodite, Nereis, Heteronereis, Sabella, Terebella, Serpula, Chaetopterus, Pheretima and Hirudinaria.
- T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm.
- Study of Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, termite, louse, honeybee, silk moth, wasp and dragon fly.
- Study of Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Mytilus, Loligo, Sepia,Octopus and Nautilus and Cypraea (cowrie).
- Study of echinoderm larvae. 8. Study of Pentaceros, Asterias, Ophiura, Clypeaster, Echinus, Echinocardium, Cucumaria and Antedon.

CORE-4 PHYSIOLOGY OF LIFE SUSTAINING SYSTEM

- Understand about the composition of food and mechanism of digestion absorption and assimilation.
- Gain knowledge of respiration and excretion and understand the mechanism of transport of gages .
- Understand about the excretion and urine formation.
- Described the mechanism of circulation and composition of blood
- Described the structure of heart, cardiac cycle, blood pressure and ECG.

PRACTICAL

- Enumeration of red blood cell using Haemocytometer.
- Estimations of haemoglobin using Sahli's haemoglobinometer.
- Preparations of haemin and haemochromogen crystals.

- Recording of blood pressure using a Sphygnomanometer.
- Enumeration of WBC cell using haemocytometer
- Examination of sections of mammalian oesophagus, stomach, duodenum, ileum, rectum, liver, trachea, lung and kidney.
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CORE-5 BIOLOGY OF CHORDATES

- Identified the taxonomic status of the entire chordates and discussed the evolutionary model of the group.
- Imparted the knowledge on ecology of some important fishes, amphibians reptiles, birds and mammals.
- Impart knowledge in comparative anatomy and development systems of chordates.
- Make able to discuss some and very important phenomena in Chordates.
- Know about the conservation and management strategies of the chordate.

PRACTICAL

- Balanoglossus, Herdmania, Branchiostoma and Colonial Urochordata.
- Sections of Balanoglossus through proboscis and branchiogenital regions.
- Sections of Amphioxus through pharyngeal, intestinal and caudal regions.
- Permanent slide of spicules of Herdmania.
- Pritis, Trygon, Torpedo, Notopterus, Hippocampus, Exocoetus, Echenesis, Anguilla, Tetradon, Anabas) ,
- Amphibia (Ichthyophis, Necturus, Hyla, Alytes, Salamandara, larval froms.
- Reptiles (Chelone, Varanus, Uromastix, chamaeleon, Dráco, Bungarus, Naja, Vipera, Crocodylus), Aves (peacock, parrot,crow,owl, Sparrow,Pigeon).
- Mammalia (Sorex, Bat, Funambulus, Loris, Herpestes and Hemiechenis)
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CORE-6 CONTROLLING AND COORDINATING SYSTEM

- Define the basic terms in histology.
- List the various types of tissues. Identify the histological peculiarities in various organs.
- Explain the location, structure and functions of various organs.
- Knowledge of neuromuscular coordination and the mechanism of osmoregulation in animals and endocrine system and their function is attained.
- Understand the menstrual cycle and the role of contraceptive in population control.

PRACTICAL

- Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex)
- Examination of sections of mammalian skin, Cartilage, Bone, Spinal cord, Nervecell, Pitutitary ,pancreas, Testies, Ovary, Adrenal, Thyroid and Parathyroid.

CORE-7 COMPARATIVE ANATOMY OF VERTEBRATE

- Understand the structures of different systems such as, integumentary, skeletal system.
- Understand the digestive system of different vertebrates .
- Understand respiratory system and accessory respiratory organs of vertebrate.

- Understand the circulatory system of different vertebrates .
- Understand the urinogenital, nervous and sensory organs in comparative way among the vertebrate groups.

PRATICAL

- Study of placoid, cycloid and ctenoid scales through permanent slides/photographs.
- skeleton of Frog, Varanus, Fowl and Rabbit.
- Carapace and plastron of turtle or tortoise. Mammalian skulls (One herbivorous and one carnivorous animal).

CORE-8 BIOCHEMISTRY OF METABOLIC PROCESS

- Attained the knowledge of macromolecule such as carbohydrates, protein and fat, their types and significance.
- Understand the knowledge of cholesterol and its biological significance.
- Described the enzymes, mechanism of enzyme action and factors affecting the enzyme activity.
- Comprehended the energy source, chemical bonds , the principles of thermodynamic and the importance of acid base balance .

PRACTICAL

- Identification of unknown carbohydrates in given solutions (Starch, Sucrose, Lactose, Galactose, Glucose, Fructose).
- Colour tests of functional groups in protein solutions.
- Action of salivary amylase under optimum conditions.
- Effect of pH on the action of salivary amylase.
- Effect of temperature on the action of salivary amylase.

CORE -9 CELL BIOLOGY

- Understand the structure of cells and cell organelles in relation to the functional aspects and understanding of the working principles and applications of microscopes.
- Describe the composition of prokaryotic and eukaryotic cells.
- Understand the structure and functions of chromosome .
- Understand mitotic and meiotic cell divisions and their significance.
- Understand the properties and treatment of cancer cells.

PRACTICAL

- Gram's staining technique for visualization of prokaryotic cells. Study various stages of mitosis from permanent slides. Study various stages of meiosis from permanent slides.
- Study the presence of Barr body in human female blood cells/cheek cells. (Preparation of permanent slides).
- Cytochemical demonstration (Preparation of permanent slides).

CORE – 10 PRINCIPLES OF GENTICS

- Explain Mendel's principle, its extension and chromosomal basis and determination of gene action from genotype to phenotype and concepts of inheritance.
- Define the terminologies in genetics.
- Describe the chromosome anomalies and associated diseases.
- Understand the theories of classical genetics and blood group inheritance in man.
- Describe the genetic variation through linkage, crossing over, chromosomal aberrations, sex determination and extrachromosomal inheritances.

PRACTICAL

- To study the Mendelian laws and gene interactions and their verification by Chisquare analyses using seeds/beads/Drosophila. Identification of various mutants of Drosophila.
- To calculate allelic frequencies by Hardy-Weinberg Law. Linkage maps based on data from crosses of Drosophila.
- Study of human karyotype (normal and abnormal). Pedigree analysis of some human inherited traits. Preparation of polytene chromosomes from larva of Chironomous/Drosophila.

CORE -11 DEVELOPMENTAL BIOLOGY

- Understand the process of development of animals.
- Understand the process of organogenesis of selected organs, development of extra embryonic membrane and the placenta.
- Inducer and inductor role in embryogenesis , metamorphosis and the process of regeneration.
- Describe the stem cell and its applications.

PRACTICAL

- Study of whole mounts and sections of developmental stages of frog through permanent slides: Cleavage stages, blastula, gastrula, neurula, tail-bud stage, tadpole (external and internal gill stages).
- Study of whole mounts of developmental stages of chick through permanent slides:Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation(Hamilton and Hamburger stages).
- Study of different types of placenta.

CORE- 12 MOLECULAR BIOLOGY

- Explain DNA structure.
- Paraphrase the Central dogma of molecular biology.
- Understand the molecular structure of genetic materials , the mechanism of gene expression and regulation .
- Illustrate the mechanism of replication, transcription and translation.
- Justify the post transcriptional and post translational modification

PRATICAL

- Study of DNA replication using Photographs or slides and special cases, e.g., Polyteny using permanent slides of polytene chromosomes.
- Preparation of liquid culture medium (LB) and raise culture of E. coli. Estimation of the growth kinetics of E. coli by turbidity method.

DSE- 1 ANIMAL BEHAVIOUR

- Describe types of innate behavior, history of behaviours
- Describe orientation and its type.
- Describe social behavior in honeybees.
- Describe sexual behavior.
- Describe biological clock.

DSE-2 ECONOMIC ZOOLOGY

- Describe apiculture method.

- Describe sericulture method and type of silkworm.
- Describe fish culture, pond preparation, diseases of fish and induced breeding method.
- Describe prawn farming, air breathing fish culture and pearl culture.
- Describe poultry and diary farming .

CORE 13- IMMUNOLOGY

- Gain basic knowledge of immunological processes at a cellular and molecular level .
- Understand central immunological principles and concepts.
- Compare and contrast the key mechanisms and cellular players of innate and adaptive immunity .
- Understand the principles governing vaccination and the mechanisms of protection against infectious diseases.
- Understand the basis of allergy and allergic diseases.

PRACTICAL

- Demonstration of lymphoid organs.
- Determination of ABO blood group.
- ELISA/ dot Elisa (using kit).

CORE -14 EVOLUTIONARY BIOLOGY

- Understand the theories of evolution and the evidences in support of evolution
- Explain the theories of organic evolution.
- Describe the concept and theories of origin of life.
- Describe evolution of man. Illustrate the presence of organisms at various geological time scale.
- Categorize different zoogeographical realms.
- Compare animal distribution in different zoogeographical realms.

PRACTICAL

- Study of fossil evidences from plaster cast models and pictures.
- Study of homology and analogy from suitable specimens/ pictures.
- Demonstration of changing allele frequencies with and without selection.
- Construction of cladogram based on morphological characteristics.

DSE-3 MICROBIOLOGY

- Determine evolution of microbiology and their role in various biological processes , Classify Microorganisms into different category according to taxonomy.
- Describe character and classification of bacteria .
- Describe character, classification and economic importance of protista.
- Describe character and replication of virus .
- Describe applications of microbiology in agriculture, industry and food.

DSE-4 PROJECT

- Make research proposal.
- Construct tool of data collection, Learn fieldwork modalities.
- Understand the process of data analysis.
- Writing research paper .