

# **Dr. Kanailal Bhattacharyya College**

## **Department of Zoology**

### **Program Outcomes, Program Specific Outcomes and Course Outcomes of B.Sc. in Zoology**

#### **Program Outcomes of B.Sc. in Zoology**

PO- Understand the animal diversity, physiological and biochemical pathways of animal and human, molecular and cell biology, developmental and evolutionary biology and applied zoology.

#### **Program Specific Outcomes of B.Sc. in Zoology**

PSO1- Understand the classification and diversity of animals.

PSO2- Gain knowledge about ecology, molecular biology, cell biology as well as biochemical and physiological pathways of animals including human.

PSO3- Gather information about parasites and immunology of host defense.

PSO4- Knowledge about developmental and evolutionary biology of animal kingdom.

PSO5- Understand the application of biological sciences in apiculture, sericulture, fisheries and medical diagnosis.

#### **Course Outcomes of B.Sc. in Zoology**

##### **SEMESTER- I**

##### **CORE COURSE 1. Non Chordata – I (Protists to Pseudocoelomates)**

##### **ZOOA-CC1-1-TH**

CO1- The student will experience about the fascinating world of invertebrate.

CO2- Learn the taxonomy and systematic and general scheme of classification and animal diversity.

CO3- learning the characteristics of major phyla from protozoa to nematode.

CO4- Gain knowledge about parasitic nature of protozoa, platyhelminthes and nematode.

##### **CORE COURSE 1. Non Chordata – I (Protists to Pseudocoelomates) Lab**

##### **ZOOA-CC1-1-P**

CO1-Students will have learning about the basic taxonomy and systematic and classification of Protozoa, Porifera, Cnidaria and Helminth groups.

CO2-They also will acquire knowledge about the biology of these taxonomic categories as well as about some acoelomate plus pseudocoelomates for their structure, function plus biology of these taxonomic categories as well.

CO3-They will also have knowledge about the basics of parasitology such as host-parasite interactions etc.

### **CORE COURSE 2: Molecular Biology**

#### **ZOOA-CC1-2-TH**

CO1- Deals with understanding the molecular aspects of the biology.

CO2- Majorly emphasizes the concepts of central dogma of molecular biology spanning from DNA Replication till Protein Synthesis and Reverse transcription.

CO3- Students will learn about DNA, RNA and mutations, gene regulations, DNA repair mechanism etc.

CO4- The students will understand genetics and relate modern DNA technology for disease diagnostics and therapy.

### **CORE COURSE 2: Molecular Biology lab**

#### **ZOOA-CC1-2-P**

CO1- Knowledge of banding patterns of Polytene chromosomes, were originally used to map chromosomes, identify small chromosome mutations, and in taxonomic identification. They are now used to study the function of genes in transcription.

CO2- Giant chromosomes in the lampbrush form are useful model for studying chromosome organization, genome function and gene expression.

CO3- DNA extraction is of primary importance to studying the genetic causes of disease and for the development of diagnostics and drugs. It is also essential for carrying out forensic science, sequencing genomes, detecting bacteria and viruses in the environment and for determining paternity.

CO4- Quantification of DNA is a very important step in many procedures where it is necessary to know the amount of DNA. Agarose gel electrophoresis has proven to be an efficient and effective way of separating nucleic acids ( DNA fragments).

CO5- Methyl green-pyronin (MGP) staining is a classical technique utilizing two basic dyes for the detection and differentiation of DNA and RNA. This cytochemical procedure allows studying nucleic acids without their extraction from the cell.

## **SEMESTER II**

### **CORE COURSE 3: Non-Chordates II – Coelomates**

#### **ZOOA-CC2-3-TH**

CO1- Understand the general characteristics and classification of phylum annelida to echinodermata.

CO2- Learn about metamerism in annelid, respiration in arthropoda.

CO3- Gain knowledge about torsion and nervous system in mollusca.

CO4- Demonstration about water vascular system in echinodermata and evolutionary significances of their larva.

### **CORE COURSE 3: Non-Chordates II – (Coelomates) Lab**

#### **ZOOA-CC2-3-P**

CO1- Students will be learning about classification of invertebrates (coelomate) and the structure, function plus biology of these taxonomic categories as well.

CO2- They will also know the Anatomy of invertebrates by studying their different systems.

### **CORE COURSE 4: Cell Biology**

#### **ZOOA-CC2-4-TH**

CO1- Introduces the basics of cell and its components and gives a strong foundation on the basic unit of life.

CO2- Helps in understanding the concepts of cellular function.

CO3- Helps the students to appreciate the phases of cell cycle and mechanisms involved in apoptosis.

CO4- Learn the updated therapeutics of cancer as well and gain knowledge on the functions of the cell.

### **CORE COURSE 4: Cell Biology Lab**

#### **ZOOA-CC2-4-P**

CO1- To study the mitosis stages from meristematic cells of onion root tips help to know the growth of the cells and the replacement of worn-out cells. Abnormalities during mitosis may alter the DNA, resulting in genetic disorders.

CO2- Meiotic stages from grasshopper testis help to know about chiasma formation, crossing over, recombination and its role in variation.

CO3- Barr bodies are needed to control how much X-linked gene product is transcribed. the Barr body guaranteed that X-linked gene product dosages are kept consistent between men and females.

CO4-Feulgen staining technique is used in histology to identify chromosomal material or DNA in cell specimens. By the help of this technique one can easily quantifying DNA amounts.

CO5- Cell viability assays are used to determine the overall health of cells, optimize culture or experimental conditions, and to measure cell survival following treatment with cytotoxic effects of compounds.

### **SEMESTER III**

#### **CORE COURSE 5 : Chordata**

##### **ZOOA-CC3-5-TH**

CO1- the students will learn about classification of phylum chordate.

CO2- Gain a knowledge about functional anatomy of protochordates and vertebrates.

CO- Learn about general characteristics, migration and parental care in pisces and amphibia.

CO4- Knowledge about biting mechanism of snakes and flight mechanism of birds.

CO5- Understand the characteristics of mammals with special reference to exoskeleton, adaptive radiation and echolocation.

#### **CORE COURSE 5 : Chordata Lab**

##### **ZOOA-CC3-5-P**

CO1- Students will understand the classification, structure, function and biology of chordates of different taxonomic classes.

CO2- They will also know the Anatomy of invertebrates by studying their different systems.CO3- They will also learn about habit, habitat and behavior of some animals.

#### **CORE COURSE 6: Animal Physiology: Controlling and Co-ordinating System**

##### **ZOOA-CC3-6-TH**

CO1- Covers the working of internal organ and system. The students will be exposed to anatomy of different human organs and their histological structures.

CO2- Helps the students to understand the physiological functions of several organ systems (integumentary, skeletal, muscular, nervous, reproductive and endocrine system).

CO3- The students will learn functioning aspects of the human body at molecular level.

CO4- The students will be able to appreciate the anatomical and physiological aspects of the human body.

#### **CORE COURSE 6: Animal Physiology: Controlling and Co-ordinating System Lab**

##### **ZOOA-CC3-6-P**

CO1- Study of muscular twitch help us to understand how muscles are contracted in controlled manner which develops tension in the muscle; also help to understand nervous system disorder

during uncontrollable muscular twitching.

CO2- Structure of squamous epithelia help to understand the structure of the inner surface of all blood vessels, wall of alveolar sacs in the lung, lines the body cavities etc.

CO3- Structure of striated muscle fibres help to know the structural organization of tissues that help to generate force and contract in order to support respiration, locomotion, and posture.

CO4- Neurons are responsible for the actual transmission of impulses. By the study of nerve cell we can easily understand how they help to send signals to and from the brain.

CO5- Histology is the study of the tissues anatomy, structure, and role. It is the study of tissues that make up the body organs, which keep the body functioning.

CO6- Microtomy is the technique used for histological and pathological studies. A tissue (or small part of it) is embedded in paraffin wax and then cut using a microtome to get thin sections, used for histological studies.

### **CORE COURSE 7: Fundamentals of Biochemistry**

#### **ZOOA-CC3-7-TH**

CO1-Addresses the structures and functions of biomolecules like carbohydrates, proteins, lipids and nucleic acids.

CO2-Traces biochemical pathways involved in metabolism of carbohydrates, lipids, amino acids and nucleic acids.

CO3-Imparts an understanding of biological oxidation, enzyme kinetics and catalytic mechanisms.

### **CORE COURSE 7: Fundamentals of Biochemistry Lab**

#### **ZOOA-CC3-7-P**

CO1- Qualitative and quantitative estimation of macromolecules.

## **SEMESTER 4**

### **CORE COURSE 8.Comparative Anatomy of Vertebrates**

#### **ZOOA-CC4-8-TH**

CO1- Gain knowledge about integumentary, digestive and respiratory system in vertebrates in comparative aspects.

CO2- Comparative anatomy of urino-genital and nervous system of vertebrates.

CO3- Details knowledge about skeletal system of vertebrates with special reference to jaw suspension of mammals.

**CORE COURSE 8: Comparative Anatomy of Vertebrates Lab**  
**ZOOA-CC4-8-P**

CO1- The morphology of a scale can be used to identify the species of fish.

CO2- Comparative study of the skeleton and skull of different species of animals in order to understand the adaptive changes they have undergone in the course of evolution from common ancestors.

CO3- Comparative study of heart and brain also help to understand the adaptive changes of the vertebrates and also help to determine evolutionary relationships between organisms.

**CORE COURSE 9: Animal Physiology: Life Sustaining Systems**  
**ZOOA-CC4-9-TH**

CO1- Encompasses certain basic concepts of chemistry and physics to understand the physiological processes governing different organ systems .

CO2 -Provides the structural details of physiologically significant organs and illustrates the integration of functional mechanisms at the molecular, cellular, tissue and organ levels for execution of essential life processes.

CO3- Extends knowledge in areas of pathophysiology and comparative physiology.

**CORE COURSE 9: Animal Physiology: Life Sustaining Systems Lab**  
**ZOOA-CC4-9-P**

CO1- Involves morphological studies of blood cells from human and cockroach.

CO2- Makes familiar with some blood parameter determining tests of clinical as well as medicolegal importance.

**CORE COURSE 10: Immunology**  
**ZOOA-CC4-10-TH**

CO1- The students will gain a knowledge about overview of immune system, antigen and immunoglobulin structure.

CO2- The types of immunity and major histocompatibility complex with a view on antigen presentation will be described.

CO3- Explain the pathways of complement system, types and mechanism of hypersensitivity.

CO4- Learn about cytokines and vaccination in reference to active and passive immunization.

**CORE COURSE 10: Immunology Lab**  
**ZOOA-CC4-10-P**

CO1- Students will develop knowledge about structures and function of lymphoid organs and

lymph nodes.

CO2- They will know the immune diffusion technique and ELISA.

## **SEMESTER V**

### **CORE COURSE 11: Ecology**

#### **ZOOA-CC5-11-TH**

CO1- Explain different component of ecology. Compare and understand the general and specific characteristics within and other environments in relation to abiotic & biotic factors.

CO2-Understand the systemic and functional morphology of various concepts of ecology to gather proper knowledge about different features of population ecology.

CO3-Understand the conservation procedure of wild animals in their natural and artificial habitat.

CO4- Explain the basic aspects of structural and functional details of environments.

### **CORE COURSE 11: Ecology Lab**

#### **ZOOA-CC5-11-P**

CO1- Quadrature methods of population density study allow us to calculate the population size and population density for the entire populations spread out over large areas.

CO2- Study of an aquatic ecosystem help to know about different planktons of water body and different parameters (like temperature, salinity, pH, dissolved O<sub>2</sub>, CO<sub>2</sub>etc.) of the water body which perform numerous valuable environmental functions.

CO3- Visit to any place of ecological interest help in meaningful understanding of the subject.

### **CORE COURSE 12.Principle of Genetics**

#### **ZOOA-CC5-12-TH**

CO1- Students will be taught Mendelian genetics, their principles and gene interaction.

CO2- Learn about chromosomal aberrations and structure of chromosomes and a basic understanding on human and *Drosophila* genetics and hereditary.

CO3- Learn about sex determination, extra chromosomal inheritance and transposable genetic elements.

CO4- Gain knowledge about molecular aspects of genetic disorders and mutations along with concepts of gene and relationship between genotype and phenotype.

### **CORE COURSE 12.Principle of Genetics Lab**

#### **ZOOA-CC5-12-P**

CO1- The  $\chi^2$  statistic is used in genetics to illustrate if there are deviations from the expected

outcomes of the alleles in a population. The purpose of this test is to determine if a difference between observed data and expected data is due to chance, or if it is due to a relationship between the variables you are studying.

CO2- Chromosomal aberrations are indicative of some damage to genetic material. Changes in chromosome number can result in spontaneous mutations, which cause damage to genetic material. Chromosomal aberrations study helps us to know about birth defects, cancer, and other late onset disease outcomes.

CO3- Pedigree Analysis helps to study family histories and inheritance of genes in humans. It is helpful to analyze an existing population when progeny data from multiple generations are limited. It helps to study species for a long generation.

## **SEMESTER VI**

### **CORE COURSE 13: Developmental Biology ZOOA-CC6-13-TH**

CO1- Learn about basic concepts of developmental biology that includes gametogenesis, cleavage and gastrulation with organizer concept.

CO2- Details of late embryonic development including placenta formation, structure and function.

CO3 - Development of eye and brain in chick with the process of induction will be described.

CO4- Give a knowledge about invitro fertilization and stem cell concept.

### **CORE COURSE 13: Developmental Biology Lab ZOOA-CC6-13-P**

CO1- Students will learn the different aspects of early, late and post embryonic developments.

CO2- They will have the knowledge about implications of developmental biology in various fields, such as in life cycle, placental structure analysis, larval study of invertebrates etc.

### **CORE COURSE 14 : Evolutionary Biology ZOOA-CC6-14-TH**

CO1- Understand the theories of evolution with a concept of geological time scale and fossils.

CO2- Explain the theory of natural selection, species concept and evolution of man.

CO3 -Knowledge about Hardy-Weinberg Law and its disrupting factors with application.

CO4- Concepts of phylogenetic trees construction and interpretation and idea about extinction.

**CORE COURSE 14 : Evolutionary Biology Lab**  
**ZOOA-CC6-13-P**

CO1- Fossils are important evidence for evolution because they show that life on earth was once different from life found on earth today. Often we can work out how and where they lived, and use this information to find out about ancient environments. Fossils can tell us a lot about the past.

CO2- Students will know about homology, analogy, phylogenetic tree making, construction of dendrogram etc., which help to show the evolutionary history between biological species or other entities based on their genetic characteristics.

**DISCIPLINE SPECIFIC ELECTIVE (DSE)**

**SEMESTER V**

**DSE (A)-1. Parasitology**  
**ZOOA-DSE(A)-5-1-TH**

CO1-Gain basic knowledge about parasitism, types of parasites and host-parasite interaction.

CO2- Knowledge about morphology, life cycle, prevalence, epidemiology, pathogenicity, diagnosis, prophylaxis and treatment of protozoan, platyhelminthes and nematodes.

CO3- Types of ticks in addition with its biology, importance and control.

CO4- Description about parasitic vertebrates includes Cookicutter Shark, Hood Mocking bird, Vampire bats and their parasitic behaviour and effect on host.

**DSE (A)- 1. Parasitology Lab**  
**ZOOA-DSE(A)-5-1-P**

CO1- Students will have learning about the basics of parasitism such as morphology, life stages of different parasites, parasitoids, parasitic behavior, host-parasite interactions etc.

**DSE (B)- 1. Endocrinology**  
**ZOOA-DSE(B)-5-1-TH**

CO1- Comprehend the basic concept of the endocrine system to gain an idea on the neuroendocrine perspectives.

CO2- Interpret the crucial role played by the hypothalamo-hypophyseal axis and to gain a detailed account of the anatomy and the functions of the peripheral endocrine glands, as well as get acquainted with the common hormonal disorders.

CO3- Decipher the detailed mechanism of action of steroidal and non-steroidal hormones and to get familiarized with common bioassay techniques like RIA and ELISA.

CO4- Understand the basic concept and hormonal aspects of the reproductive cycles in primates and non-primate mammals.

### **DSE (B) 1. Endocrinology Lab**

#### **ZOOA-DSE(B)-5-1-P**

CO1- Dissection and display of endocrine glands in laboratory rat help to give idea about the actual location, structure of the glands.

CO2- Tissue fixation, embedding, microtomy, H-E staining help to prepare histological preparation of the endocrine glands.

CO3- Histology is the study of the gland tissues' anatomy, structure, and role. It is the study of tissues that make up the specific glands. It sheds light on the importance of the histological perspective in the study of endocrine gland functions and the diagnosis of certain diseases.

## **SEMESTER VI**

### **DSE (A)-2 : Animal Biotechnology**

#### **ZOOA-DSE(A)-6-2-TH**

CO1- Gain knowledge organization of *E.coli* and *Drosophila* genome.

CO2- Knowledge regarding molecular techniques in gene manipulation including cloning process.

CO3- Methods of cloned and transgenic animals and their application in different aspects.

CO4- Knowledge about animal cell culture, whole animal cloning and gene therapy.

### **DSE (A)-2 : Animal Biotechnology Lab**

#### **ZOOA-DSE(A)-6-2-P**

CO1- This course teaches organization and expression of bacterial genome.

CO2- This skill based course will teach the students the various instrumentations and techniques that are used in the analytical laboratories.

CO3- This course prepares the students in appreciating the its benefits and applications in biotechnological, pharmaceutical, medical and agricultural field.

### **DSE (B)-1 : Animal Behaviour and Chronobiology**

#### **ZOOA-DSE(B)-6-1-TH**

CO1- Enables students to learn about the diversity and significance of behaviours displayed by animals.

CO2- Inculcates a brief idea on natural selection shaping behavioural patterns as well as the influence of environmental and genetic interactions on animal behaviour.

CO3- Provides an understanding of regulatory aspects of exogenous rhythm on biological clock in shaping rhythmic behaviours in animals.

**DSE- B Animal Behaviour and Chronobiology Lab**  
**ZOOA-DSE (B)-6-1-P**

CO1- Encourages observational learning of different animal behaviours through experimental demonstrations as well as field visits.

CO2- Acquaints students of the circadian rhythms operating in humans through project works.

**DSE-B- Fish and Fisheries**  
**ZOOA-DSE (B)-6-2-TH**

CO1-Students will learn details about taxonomy and biology ( physiology, anatomy) of fishes.

CO2- Students will also learn about various aquaculture techniques in details.

CO3- To analyze the different craft and gears used in fisheries.

CO4- To evaluate the water quality suitable for culturing fishes and to understand the common diseases in fishes.

CO5- Application of principles of the designs involved in construction of a farm and to know the conditions of development of aquatic organisms and its habitat formation.

**DSE-B- Fish and Fisheries**  
**ZOOA-DSE (B)-6-2-P**

CO1- Students will have learning about the basic taxonomy and systematic and classification of fishes. They also learn about their basic structures

CO2- The morphology of a scale can be used to identify the species of fish.

CO3- Students will also learn about different craft and gears used in fisheries.

CO4- Study of an aquatic ecosystem help to know about different parameters (like temperature, salinity, pH, alkalinity, salinity etc.) of the water body which help to understand the proper environmental conditions for fish culture.

## **SKILL ENHANSMENT COURSES (SEC)**

### **SEMESTER III**

#### **SEC (A)-1 : Apiculture**

##### **ZOOA-SEC(A)-3-1-TH**

CO1- Gain a basic idea on the external morphology and social organization of honeybees.

CO3- To procure a detailed concept on the scientific, modern method of bee-keeping.

CO4- To get a basic idea on the various products of the apiculture venture and their uses and to explore the recent efforts employed in the apiculture venture, aimed at promoting the industry.

#### **SEC (B)-1.Aquarium Fish Keeping**

##### **ZOOA-SEC(B)-4-1-TH**

CO1- To develop an understanding of the ample prospects of ornamental fish-keeping as a successful cottage industry.

CO2- Gather a consolidated concept regarding the general biology, morphological attributes and sexual dimorphism of both freshwater and marine aquarium fishes.

CO3- Understand the food and feeding techniques essential for rearing ornamental fishes with the proper techniques of fish handling, packing and transportation.

CO4-To gain a basic concept on the general maintenance of aquarium and explore the potential of setting up an aquarium fish farm as a cottage industry.

# **Zoology Practical Course Outcome**

## **ZOOG**

### **SEMESTER I**

#### **CORE COURSE 1 : Animal Diversity**

##### **ZOOG-CC1-1-TH**

CO1- Describe the identifying characters of the major taxa.

CO2- Explain the basic aspects of classification of invertebrates

CO3- Proper knowledge about habitat, biodiversity, organization and taxonomic status of invertebrates

CO4- Interpret the affinities, adaptation and evolutionary relationships of the major parasitic helminthes and to explain their medical importance in terms of disease.

#### **CORE COURSE 1. Animal Diversity Lab**

##### **ZOOG-CC1-1-P**

CO1- Students will have learning about the basic taxonomy and systematic, classification, structure, function and biology of Protozoa, Porifera, Cnidaria, Helminth, Annelida, Arthropoda, Mollusca, Echinodermata, protochordata groups. They also learn about Agnatha, pisces, Amphibia, Reptilia, Aves and mammals.

CO2- They also will acquire knowledge about the biology of these taxonomic categories and their anatomy.

CO3- They will learn about the differences between poisonous and non-poisonous snakes. Animal album will help them to understand this field better and will increase their interest.

### **SEMESTER 2.**

#### **CORE COURSE 2. Comparative Anatomy & Developmental Biology**

##### **ZOOG-CC2-2-TH**

CO1- Description and comparative account of integumentary, digestive, respiratory, circulatory and urinogenital system.

CO2- Knowledge about early embryonic development includes gametogenesis, cleavage and gastrulation.

CO3- Understand late embryonic development placenta and its function.

## **CORE COURSE 2.Comparative Anatomy & Developmental Biology Lab**

### **ZOOG-CC2-2-P**

CO1- Comparative study of the limb bones and skull of different species of animals in order to understand the adaptive changes they have undergone in the course of evolution from common ancestors.

CO2- Students will learn the different aspects of early, late and post embryonic developments and different larval stages of animals.

CO3- Study of mammalian placenta help to understand about different structures of placenta present in different mammalian species and how nutrients and oxygen are transferred from the mother to the fetus, and for disposing of fetal waste products.

## **SEMESTER III**

## **CORE COURSE 3. PHYSIOLOGY AND BIOCHEMISTRY**

### **ZOOG-CC3-3-TH**

CO1-Imparts the knowledge of vital physiological processes like digestion , respiration , circulation, excretion , reproduction, nerve and muscle physiology accompanied by the integrated molecular as well as functional mechanisms of cells, tissues and organs in executing these processes.

CO2-Provide structural and anatomical details of vital organs.

CO3-Introduces biochemical pathways of carbohydrate, protein and lipid metabolism.

CO4-Describes classification of enzymes along with mechanism and inhibition of Enzymatic reactions.

## **CORE COURSE 3. PHYSIOLOGY AND BIOCHEMISTRY Lab**

### **ZOOG-CC3-3-P**

CO1- Qualitative tests of carbohydrate and study of histological sections of physiologically significant glands and organs.

## **SEMESTER IV**

## **CORE-COURSE 4.Genetics & Evolutionary Biology**

### **ZOOG-CC4-4-TH**

CO1-To develop an understanding of the basics of Mendelian Genetics and its extension.

CO2-Gain a detailed concept about chromosomal mutations, gene mutations and induced mutations.

CO3- Develop an understanding about sex determination and dosage compensation in

*Drosophila*.

CO4- Gain an overview of the basic evolutionary concepts like the origin of life on earth, different evolutionary theories, modern concept of evolution and the modes of speciation.

#### **CORE-COURSE 4.Genetics & Evolutionary Biology Lab ZOOG-CC4-4-P**

CO1- The  $\chi^2$  statistic is used in genetics to illustrate if there are deviations from the expected outcomes of the alleles in a population. The purpose of this test is to determine if a difference between observed data and expected data is due to chance, or if it is due to a relationship between the variables you are studying.

CO2- Study of karyotype help to identify and evaluate the size, shape, and number of chromosomes in body cells. Extra or missing chromosomes, or abnormal positions of chromosome pieces, can cause genetic problems with a person's body functions.

CO3- Study of limbs and skull of horse help to understand the phylogeny of horse. It provides most complete record of evolution.

CO4- Study of Darwin's finches provide fundamental insights into processes of natural selection and adaptive radiation.

CO5- Visit to a museum will inspire us to increase our interest in an area of study.

#### **DISCIPLINE SPECIFIC COURSES (DSE)**

##### **Semester V**

##### **DSE-(A)-1 : Applied Zoology ZOOG-DSE-A-5-1-TH**

CO1- Introduction to parasitism and the different biological inter-relationships and host parasite relationships.

CO2- Knowledge of biology, life cycles and control measures of parasitic protozoans, helminthes, some economically and medically important insects.

CO3- Awareness regarding epidemiology of certain infectious diseases.

Co4- Principles, techniques and biotechnological advancements in the fields of fisheries, poultry farming and animal husbandry.

##### **DSE-(A)-1 : Applied Zoology Lab ZOOG-DSE-A-5-1-P**

CO1- Identification of parasites and human disease associated vectors from permanent-slides/photomicrographs or specimens.

CO2- Detection of the nature of damage caused by some economically important pests.

CO3-Observational learning of animal breeding and management practices from field visits.

### **Semester-VI**

#### **DSE-(B)-2 : Ecology& Wild life Biology**

##### **ZOOG-DSE-B-6-2-TH**

CO1- Introduction to ecology with a conceptual knowledge.

CO2- Attributes of ecology includes population and community. Their characteristics also described.

CO3- Types and characteristics of ecosystem and its impact on human life.

CO4- Understand the wildlife conservation with its necessity, idea about National parks & sanctuaries and tiger conservation.

#### **DSE-(B)-2 : Ecology& Wild life Biology Lab**

##### **ZOOG-DSE-B-6-2-P**

CO1- Students will learn about different flora and fauna, pug marks, hoof marks nest building, antlers etc.

CO2- They will acquire knowledge about various tools and techniques of field ecology.

CO3- Study of an aquatic ecosystem help to know about different planktons of water body and different parameters (like temperature, salinity, pH, dissolved O<sub>2</sub>, CO<sub>2</sub> etc.) of the water body which perform numerous valuable environmental functions.

### **SKILL ENHANSMENT ELECTIVE COURSE (SEC)**

#### **SEMESTER –III**

##### **SEC-A APICULTURE**

##### **ZOOG-SEC-A-3-1-TH**

CO1- To get acquainted with the general biology and social organization of honeybees and gather a basic concept on the modern method of bee rearing.

CO2- Get familiarized with the common diseases and natural enemies of honeybees and their prevention and control strategies.

CO3- Learn about the various products of the apiculture industry.

CO4-To explore the recent efforts employed in the apiculture industry for its betterment.

## **SEMESTER – IV**

### **SEC (B)-2 : AQUARIUM FISH KEEPING**

#### **ZOOG-SEC-B-4-2-TH**

CO1- To gain a detailed idea regarding the general biology, common features and sexual dimorphism of freshwater and marine aquarium fishes.

CO2- Get acquainted with the proper feeding protocols crucial for rearing aquarium fishes.

CO3- Develop an understanding of the basic concepts of fish handling and transportation.

CO4- Gather knowledge regarding the profuse prospects of aquarium fish keeping as a successful cottage enterprise.

## **SEMESTER –V**

### **SEC-(A)-3 : Sericulture**

#### **ZOOG-SEC-A-5-3-TH**

CO1- Describes moriculture practices, introduces history and importance of sericulture.

CO2- Learning of biology management and rearing procedures of silk worm along with the various techniques involved in silk production.

CO3 -Provides detailed information about the diseases and disease causing agents of silk worm and mulberry with disease management techniques.

CO4- Makes learners eligible to secure an employment in sericulture industries.

## **SEMESTER –VI**

### **SEC-(B)-4 : Medical diagnosis**

#### **ZOOG-SEC-B-6-4-TH**

CO1- Introducing essential concepts of physiology that determines the choice of diagnostics tools, the clinical utility of common biometrics and patient examinations.

CO2- Addresses the importance of analyzing composition of various body fluids and the diagnostic information revealed by these analyses.

CO3- Basic understanding of clinical chemistry and medical microbiology with emphasis on diagnosis and diagnostic techniques for infectious and noninfectious diseases.