DANTULURI NARAYANA RAJU COLLEGE
(Autonomous)
BHIMAVARAM, W.G.DIST, ANDHRA PRADESH, INDIA, PIN- 534202.
(Accredited at 'B^{++}' level by NAAC)
(Affiliated to Adikavi Nannaya University, Rajamahendravaram)

ZOOLOGY
SEMESTER –I

PAPER – I - ANIMAL DIVERSITY- BIOLOGY OF NON-CHORDATES (THEORY PAPER)

CO	COURSE Outcomes	Levels
CO1	Demonstrate the application of taxonomic principles to identify and classify different invertebrate specimens into their respective phyla.	L2
CO 2	Explain the main differences between various invertebrate phyla in terms of their anatomical structures and physiological processes	L2
CO 3	Apply knowledge of invertebrate life cycles to predict and interpret the adaptive significance of different reproductive strategies employed by various animals	L3
CO 4	Apply principles of invertebrate evolution to interpret the adaptive significance of specific traits or behaviors observed in different invertebrate taxa.	L3
CO 5	Compare the structural adaptations of different invertebrate taxa to their habitats and lifestyles	L4
CO 6	Evaluate the diversity, complexity, and importance of non-chordate animals in the natural world	L5

PAPER – I - ANIMAL DIVERSITY- BIOLOGY OF NON-CHORDATES (PRACTICAL PAPER)

CO	COURSE Outcomes	Levels
CO1	Identify the key characteristics of different invertebrate phyla.	L2
CO 2	Demonstrate skill in preparing microscope slides of invertebrate specimens	L2
CO 3	Analyze collected data sets of invertebrate abundance, diversity, and distribution	L4
CO 4	Students will critically assess and interpret the external and internal anatomy of selected invertebrate taxa, through virtual dissections	L5
CO 5	Students will be able to design and run vermiculture system with latest and innovative methods	L6

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SEMESTER –II

COURSE– II - ANIMAL DIVERSITY- BIOLOGY OF CHORDATES (THEORY PAPER)

CO	COURSE Outcomes	Levels
CO1	Develop an understanding of the characters used to classify besides being able to differentiate the organisms belonging to different taxa	**L2-**
CO 2	Identify the anatomical features and physiological adaptations of chordates	**L2**
CO 3	Relate the knowledge of vertebrate life cycles to predict and interpret the adaptive significance of different reproductive strategies employed by various animals	**L3**
CO 4	Apply knowledge of chordate physiology to predict how changes in environmental factors,might affect the metabolic rates and behavior of different vertebrate species.	**L3**
CO 5	Compare and contrast the evolutionary relationships between major groups of chordates	**L4**
CO 6	Students will evaluate the effectiveness of various conservation strategies for protecting endangered chordate species,	**L5**

COURSE– II - ANIMAL DIVERSITY- BIOLOGY OF CHORDATES (PRACTICAL PAPER)

CO	COURSE Outcomes	Levels
CO1	List examples of representative species within each chordate class, along with their key anatomical features and ecological adaptations.	**L1**
CO 2	Apply taxonomic keys and identification guides to classify and identify chordate specimens based on external morphology, skeletal characteristics, and other diagnostic features.	**L3**
CO 3	Utilize dissection techniques to explore the internal anatomy of representative chordate species.	**L2**
CO 4	Analyze comparative anatomical data from different chordate taxa	**L4**
CO 5	Synthesize information from laboratory investigations	**L6**

SEMESTER –III

COURSE – III - CELL BIOLOGY, GENETICS & EVOLUTION (THEORY PAPER)

CO	COURSE Outcomes	Levels
CO1	Recall fundamental concepts in cell biology, including cell structure, organelle function, and cellular processes such as metabolism and cell division	**L1**
CO 2	Discuss different Cellular transport mechanisms,energy metabolism and cell cycle stages	**L2**
CO 3	Explain the principles of classical and molecular genetics, including Mendelian inheritance patterns, genetic variation, and gene expression	**L2**
CO 4	Apply genetic principles to solve problems related to inheritance, gene mapping, and genetic disorders	**L3**
CO 5	Analyze evolutionary processes and patterns, including natural selection, genetic drift, speciation, and the evidence for evolution	**L4**
CO 6	Evaluate the impact of genetic variation on evolution, population genetics, and human health	**L5**

COURSE– III- CELL BIOLOGY, GENETICS & EVOLUTION (PRACTICAL PAPER)

CO	COURSE Outcomes	Levels
CO1	Memorize the functions of cellular organelles and structures	**L1**
CO 2	List examples of different cell types and their specialized functions in multicellular organisms	**L2**
CO 3	Interpret diagrams, micrographs, and experimental data related to cell structure and function, identifying key features and patterns observed in different cell types and cell divisions in experimental conditions.	**L3**
CO 4	Students will analyze genetic principles and utilize appropriate tools to dissect and interpret problems related to population genetics, genetic inheritance, and genetic disorders	**L4**
CO 5	Students will evaluate the impact of various inherited genetic disorders, analyzing the associated genetic mutations, their physiological effects, and implications for affected individuals.	**L5**

SEMESTER –IV
COURSE– IV - ANIMAL PHYSIOLOGY, MOLECULAR BIOLOGY & EMBRYOLOGY (THEORY PAPER)

CO	COURSE Outcomes	Levels
CO1	Explain how different physiological systems coordinate to maintain internal balance in animals.	**L2**
CO 2	Discuss the relationships between environmental factors and physiological adaptations in animals.	**L2**
CO 3	Relate the molecular basis of inheritance and gene regulation in prokaryotic and eukaryotic organisms.	**L3**
CO 4	Demonstrate the application of molecular biology concepts in practical scenarios, such as designing experiments or interpreting genetic data.	**L3**
CO 5	Compare and contrast the mechanisms of embryonic patterning and morphogenesis across different species.	**L4**
CO 6	Evaluate the reliability and validity of experimental evidence and scientific literature in the field of embryology, animal physiology.	**L5**

COURSE– IV- ANIMAL PHYSIOLOGY, MOLECULAR BIOLOGY & EMBRYOLOGY (PRACTICAL PAPER)

CO	COURSE Outcomes	Levels
CO1	Demonstrate practical skills in conducting physiological experiments, including using laboratory equipment and techniques.	**L3**
CO 2	Reinforce identification skills and understanding of histological structures.	**L3**
CO 3	Understand the importance of biochemical analysis in biological research.	**L2**
CO 4	Students will evaluate the significance of embryological concepts and the technique of fate mapping, critically assessing their implications and applications in developmental biology	**L5**
CO 5	Communicate findings effectively through presentations, reports, or scientific papers.	**L6**

COURSE– V - IMMUNOLOGY & ANIMAL BIOTECHNOLOGY (THEORY PAPER)

CO	COURSE Outcomes	Levels
CO1	Recognizing the distinction between innate and adaptive immunity and explaining their respective roles in host defense.	L2
CO 2	Describing the structure and function of key immune cells, such as lymphocytes, macrophages, and dendritic cells.	L2
CO 3	Differentiating between the four types of hypersensitivity reactions (Type I to Type IV) based on underlying immunological mechanisms.	L3
CO 4	Apply knowledge on cloning vectors, Recombinant DNA technology, transgenesis, stem cells and their applications.	L3
CO 5	Analyzing the biochemical pathways involved in fermentation, such as glycolysis, alcoholic fermentation, and lactic acid fermentation, and their roles in energy production and substrate utilization	L4
CO 6	Critically examining ethical principles, moral values, and animal welfare concerns related to the genetic engineering, cloning, and use of animals in biomedicine, agriculture, and environmental management	L5

COURSE– V - IMMUNOLOGY & ANIMAL BIOTECHNOLOGY (PRACTICAL PAPER)

CO	COURSE Outcomes	Levels
CO1	Recognize the role of lymphoid organs in the immune system.	L1
CO 2	Microscopic examination and identification of different histological slides .	L3
CO 3	Demonstration of the blood group determination process.	L3
CO 4	Analyze the results of an ELISA to determine the presence of specific antigens or antibodies.	L4
CO 5	Students will critically evaluate the effectiveness and ethical implications of various biotechnological techniques in animal science	L5

SEMESTER –V

COURSE– VI - SUSTAINABLE AQUACULTURE MANAGEMENT (THEORY PAPER)

CO	COURSE Outcomes	Levels
CO1	Understand the taxonomic keys, morphometric measurements, and diagnostic characters to classify different Aquatic species	**L2**
CO 2	Explain the ecological principles underlying sustainable aquaculture practices, including water quality management and habitat conservation	**L2**
CO 3	Designing and operation of different aquaculture systems, including pond culture, cage culture, raceways, and recirculating aquaculture systems	**L3**
CO 4	Calculate the advantages and limitations of extensive, semi-intensive, and intensive aquaculture production methods for various aquatic species	**L3**
CO 5	Analyse knowledge of aquaculture nutrition and health management to optimize feed formulations and disease prevention strategies	**L4**
CO 6	Evaluate the sustainability of different aquaculture systems based on criteria such as resource use efficiency and ecosystem health	**L5**

COURSE– VI - SUSTAINABLE AQUACULTURE MANAGEMENT (PRACTICAL PAPER)

CO	COURSE Outcomes	Levels
CO1	Recognize the importance of accurate identification of different aquatic species	**L2**
CO 2	Perform a basic external examination of fish and prawns to identify signs of disease.	**L3**
CO 3	Demonstration of different laboratory test for determination of water quality parameters	**L3**
CO 4	Students will critically evaluate the step-by-step procedure of the hypophysation technique,	**L5**
CO 5	Students will design innovative pond management strategies aimed at maximizing fish and prawn yield	**L6**

COURSE– VII - POST HARVEST TECHNOLOGY FISH AND FISHERIES (THEORY PAPER)

CO	COURSE Outcomes	Levels
CO1	Recall the principles and importance of post-harvest handling and processing in the fishery industry	L1
CO 2	Interpret the principles behind different fish processing techniques and their applications in preserving fish quality.	L2
CO 3	Classify various fish products and by-products throwing light on their significance	L2
CO 4	Apply appropriate post-harvest handling techniques to maintain the quality and safety of fish products	L3
CO 5	Conduct a detailed analysis of the effectiveness of HACCP protocols within fisheries processing units	L4
CO 6	Evaluate the efficacy of novel post-harvest technologies in improving fish quality and safety.	L5

COURSE– VII - POST HARVEST TECHNOLOGY FISH AND FISHERIES (PRACTICAL PAPER)

CO	COURSE Outcomes	Levels
CO1	Understand the concept of organoleptic evaluation and its significance in assessing the sensory attributes of fish or fishery products.	L2
CO 2	Apply appropriate drying techniques to preserve fish products.	L3
CO 3	Analyze the operation and maintenance procedures of analytical instruments like spectrophotometers, titrators, and moisture analyzers utilized for conducting salt, protein, and moisture analyses	L4
CO 4	Evaluate different extraction methods for isinglass, collagen, and chitosan from shrimp and crab shells	L5
CO 5	Develop step-by-step procedures for optimizing seafood freshness, safety, and marketability, while emphasizing sustainability and environmental responsibility	L6