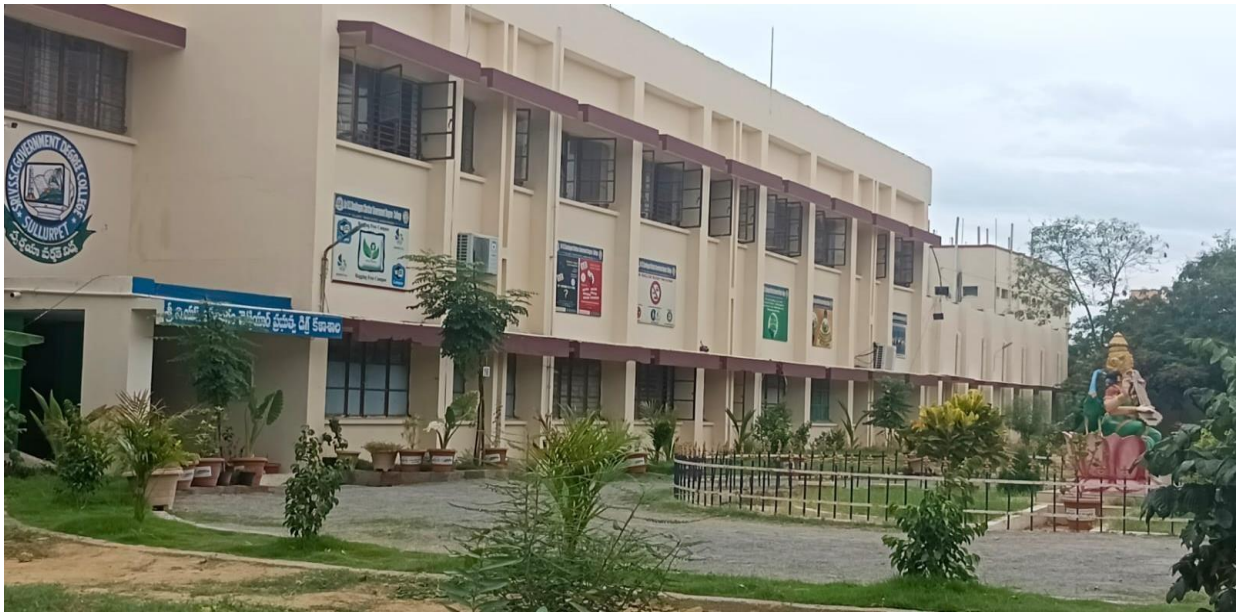
BOARD OF STUDIES MEETING IN PG ZOOLOGY



DEPARTMENT OF ZOOLOGY

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE

SULLURPET, TIRUPATI DISTRICT, ANDHRA PRADESH

(AUTONOMOUS)

ACCRIDITED BY NAAC WITH A GRADE

(Affiliated to Vikrama Simhapuri University, Nellore)

www.gdcsullurpet.edu.in, sullurpet.jkc@gmail.com

SEPTEMBER-2025

INDEX

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE
(AUTONOMOUS)
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Proceedings of the principal

Rc.No.6/SVSSC/Autonomous/modif.proc/BoS/AC/2025-26. **Date: 10-07-2025**

Sir/Madam

Sub: Modification of PG Board of Studies in Zoology from the AY 2025-26.

Ref: 1. No.F.2-10/2023 (AC-Policy), dated 10-07-2024.

2..Rc.No.3/SVSSC/Autonomous/BoS/AC/2024-25

In partial modification of the earlier proceedings cited above the revised proceedings is issued in respect of PG Board of Studies in Zoology from the academic year 2025-26 ,a term of two years from 2025–26 to 2026– 27, or until the employees retire or transfer, whichever comes first. I hope you will accept the appointment and provide insightful advice and recommendations for the college

S. No	Name and designation	Position	Chairperson/ Member
1	**Dr. P. Victoria Rani** Lecturer in Botany SVSSC Govt. Degree College(A),Sullurpet Email:pvrani25@gmail.com Mobile ,8919735237	In- charge of the Department	Chairperson
2	**Sri S. Srinivas** Lecturer in Zoology SVSSC Govt. Degree College (A),Sullurpet Email: sanakasrinivas00@gmail.com , 8247568643	Faculty Member	Faculty Member
3	**Dr. M. Suseela** Assistant Professor in Zoology, V.S. University College, Kavali. Email:drsuseelameesala@gmail.com Ph. No: 9849225711	University Nominee	Member

4	**Dr. K. Narasimha Varma** Head, Department of Zoology S.V.A. Govt. Degree College,Srikalahasti Email:varmazoology@gmail.com, 9440167239	Subject Experts from outside parent University	Members
5	**Dr.R.Chandra Mouli** Lecturer in Zoology S.V.A.Govt.DegreeCollege,Srikalahasti Email : reddy.cmouli@gmail.com ,8125969136		
6	**Sri P.Samuel** Assistant Conservator of forests Office of the principle chief conservator of forests Mangalagiri AP. 6281973576	Representative from Industry	Member
7	**Smt. M. R. Sujeevana Rao** J.L in Zoology MJPAPBCWREI School& College, Doravarisatram Email:sujiuday2513@gmail.com 9381533729	Alumnus	Member

PRINCIPAL
Sri VSSC Govt. Degree College
SULLURPET - 524121,
Tirupathi Dt, (AP)

DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES MEETING On 20th SEPTEMBER, 2025
Members Present

Sr. No	Name of the member present	Designation	Signature
1	Dr.P. Victoria Rani	Chairman	
2	Sri. S. Srinivas	Member	
3	Dr M Suseela	University nominee	
4	Dr. K. Narasimha Varma	Member	
5	Dr R.Chandra Mouli	Member	
6	Sri . P.Samuel	Member	
7	Smt. M.R. Sujeevana Rao	Member	

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE

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DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES MEETING On 20th SEPTEMBER, 2025

AGENDA

- To approve the course structure, and credits for the M.Sc Zoology (I,II,III&IV semesters)
- To approve the syllabus with minor modifications of the affiliating university.
- To approve the blue print and model question paper.
- To approve the internal, external, and practical assessment procedure.
- To approve the list of examiners.
- To approve the planned departmental activities for the 2025–26 academic year.
- Whatever else, with the chair's approval.

Dr P. Victoria Rani
Chairman, Boad of Studies in zoology
Sri VSSC Government Degree college (A)
Sullurupeta, Andhra Prades

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DEPARTMENT OF ZOOLOGY
BOARD OF STUDIES MEETING, 20th SEPTEMBER, 2025

MINUTES OF THE MEETING

The members of the Board of Studies of M.Sc Zoology met virtually on 20th September, 2025, at 2:00 p.m. under the chairmanship of Dr.P. Vitoria Rani,Head of the department of Zoology. Following extensive deliberation, the board resolved to approve the following resolutions: course structure, credits, syllabus, blue print, model question paper, internal, external, practical, and projectassessment procedures, add-on courses, activities to be carried out, list of examiners and multidisciplinary courses for the 2025–26 academic year.

RESOLUTIONS

- Resolved to accept the I&II semesters course structure and credits as specified in Annexure I.
- Resolved to adopt the syllabus with the minor changes listed in Annexure II and IIA
- Resolved to accept the blue print and model question papers mentioned in Annexure III.
- Resolved to accept the external, internal, and practical evaluation and assessment procedures listed in Annexure IV.
- Resolved to approve the examiners' list provided in Annexure V.
- The resolution was made to approve the list of activities carried out by the department for the academic year 2025–26, as mentioned in Annexure VII

Dr P. Victoria Rani
Chairman, Boad of Studies in zoology
Sri VSSC Government Degree college (A)
Sullurupeta, Andhra Pradesh

ANNEXURE-I

COURSE STRUCTURE

M.Sc ZOOLOGY

SEMESTER - I

Year	Semester	Course Code	Title of the course	Status of the paper	Course Category	Credit hrs/ week	No of Credits/ Week
I	I	**Theory**					
		101	Comparative Anatomy of Invertebrate & Chordata	Core course -1	Core Course	4	4
		102	A. Cell Biology and Immunology B. Immunotechnology	Core course -2	Core Course	4	3
		103	A. Comparative Animal Physiology B. Endocrinology	Core course -3	Core Course	4	3
		105	A. Bioanalytical Tools and Techniques-1 B. Histology and Histochemistry	Skill oriented course -1	Skill oriented course	4	3
		106	A. Poultry science and management B. Economic Zoology	Skill oriented course -2	Skill oriented course	4	3
		107	Open online transdisciplinary course-1	Online Course	Open Online Course	0	2
		108	Indian Knowledge Systems-1	Audit Course	Audit Course	4	0
			Practicals				
		105	Practical – I	Paper – CC2 &3	Practical	6	2
		109	Practical – II	Paper – SOC1&2	Practical	6	2
						36	22

SEMESTER - II

Year	Semester	Course Code	Title of the course	Status of the paper	Course Category	Credit hrs/ week	No of Credits/ Week
I	I	**Theory**					
		201	Genetics and Evolution	Core course -4	Core Course	4	4
		202	A. Biomolecules: Structure and function B. Neurobiology and Ethology	Core course -5	Core Course	4	3
		203	A. Developmental biology B. Animal biotechnology	Core course -6	Core Course	4	3
		205	A. Molecular Biology B. Medical biotechnology IPR, Biosafty and Bioethics	Skill oriented course -3	Skill oriented course	4	3
		206	A. Environmental biology B. EIA and Green Auditing	Skill oriented course -4	Skill oriented course	4	3
		207	Open online transdisciplinary course-2	Online Course	Open Online Course	0	2
		208	Indian Knowledge Systems-2	Audit Course	Audit Course	4	0
			Practicals				
		204	Practical – I	Paper – CC5 &6	Practical	6	2
		209	Practical – II	Paper – SOC3&4	Practical	6	2
						36	22

SEMESTER - III

Year	Semester	Course Code	Title of the course	Status of the paper	Course Category	Credit hrs/ week	No of Credits/ Week
II	III	**Theory**					
		301	Applied Toxicology	Core course -7	Core Course	4	4
		302	A. Enzymology & Metabolism B. Biostatistics and Bioinformatics	Core course -8	Core Course	4	3
		303	A. Wildlife Conservation Biology and Field Techniques B. Apiculture	Core course -9	Core Course	4	3
		305	A. Bioanalytical Tools & Techniques-II B. Forensic Science	Skill oriented course -5	Skill oriented course	4	3
		306	A. Principles and Practices of Aquaculture B. Genetic Engineering	Skill Oriented Course -6	Skill oriented course	4	3
			Practicals				
		304	Practical – I	Paper – CC 8&9	Practical	6	2
		307	Practical – II	Paper – SOC (5&6)	Practical	6	2
						36	22

SEMESTER - IV

Year	Semester	Course Code	Title of the course	Course Category	Credit hrs/ week	No of Credits/ Week
II	IV	401	Open Online Skill Development Course	Open Online Skill Development Course	0	4
		402	Open Online Skill Development Courses	Open Online Skill Development Courses	0	4
		403	Project Work	Project Work	6	12
		Conduction Classes for Competitive exams ,communication skill and UEG/NET Examinations			4	0
					10	20

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ANNEXURE-II

M.Sc., ZOOLOGY

(Effective from the batch of Student admitted during the Academic year 2024-25)

SEMESTER – I

CORE COURSE-1

(CC-1) ZOO 101: COMPARATIVE ANATOMY OF INVERTEBRATA AND CHORDATA

General Course Objectives:

While studying the **Comparative anatomy of Invertebrates and Chordates** course, the student shall be able to:

1. This Course develops concepts in animal Taxonomy and its application, General organization of animal kingdom,
2. Develops concepts regarding various Invertebrate and Vertebrate comparative morphology and anatomy.
3. Describes the relationships among animals and the development of Coelom
4. Learners gain Knowledge and develop skill over the comparative anatomy of invertebrates and Vertebrates.
5. Enumerate the origin and classification of Vertebrates.

INVERTEBRATA

Unit-I

1.1 Species concept, International code of Zoological nomenclature, Taxonomical procedures, New trends in taxonomy.

1.2 Acoelomata, Pseudocoelomata, Coelomata, Proterostornia and Dueterostornia.

1.3 Patterns of feeding and digestion in lower metazoan. Feeding in polychaeta, Mollusca, Echinodermata.

1.4 Tortion in Mollusca, Water vascular system in Echinoderms

Unit-II

2.1 Respiration: Structure of Gill, Lung and Trachea and Mechanism of respiration.

2.2 Circulation: Circulation system in Annelids, Arthropods and Mollusca.

2.3 Nervous System: Nervous system of Annelida, Arthropoda and Mollusca.

2.4 Larval forms of Crustaceans and Echinodermata and its phylogenetic significance.

CHORDATA

Unit-III

3.1 Integumentary derivatives of Vertebrates: - Skin structure and functions- glands, scales, horns, feathers& hair.

3.2 Evolution of heart: - structure- blood circulation-aortic arches and portal system.

3.3 Respiratory organs in vertebrates – types – structure -mechanism of respiration.

3.4 Comparative anatomy of brain -structure & composition in relation to its functions.

Unit- IV

4.1 Urino-genital system in vertebrates.

4.2 Comparative anatomy of reproductive system among Amphibians, Reptiles, Aves and Mammalians: - Organs of male reproductive system – organs of female reproductive system –functions.

4.3 Organs of vision & mechanism of vision in mammalians.

4.4 Structure of hearing organs in mammals - mechanism of hearing.

Invertebrates

Course Outcomes:

1. Understanding the General Characteristics, Principles of classification, general biology of Invertebrate Communities.
2. To understand the various biological functions, the evolutions of life from most primitive to most advanced form with respective to their habit and habitat.
3. To understand the various physiological mechanisms among Invertebrates and their significance among Invertebrate Phyla.

Vertebrates

Course Outcomes:

1. Understanding the comparative aspects of different organs systems among chordate Phyla.
2. Explain the similarity and differences in structure and function of organs in different groups of Chordates.
3. In depth understanding of Anatomical features of Integumentary, Circulatory, Reproductive, Respiratory, Receptor, Nervous systems among Chordate groups.
4. The students may apply this knowledge in taxonomy related research and job opportunities.

SUGGESTED READING MATERIAL:

1. Invertebrate Zoology ------- EL Jordan; P.S. Verma
2. A Text Book of Zoology Vol.I ------ P.S. Dhami; Jk.Dhami.
3. A Text Book of Invertbrate zoology ----- R.L.Kotpal.
4. Biology of Animals --- Cleveland P. Hickman JR Larryds. Roberts.
5. Vertebrate Zoology ------- EL Jordan; P.S. Verma
6. A Text Book of Zoology Vol.II ------ P.S. Dhami; Jk.Dhami.
7. A Text Book of Vertbrate zoology ----- R.L.Kotpal.
8. Biology of Animals --- Cleveland P. Hickman JR Larryds. Roberts.
9. Alexander, R.M. The Chordata. Cambridge University Press, London.
10. Barnes, R.D. Invertebrate Zoology, III edition. W.b. Saunders Co., Philadelphia, 1980.
11. Bourne, GH. The structure and functions of nervous tissue. Academic Press, New York.

SEMESTER – I

CORE COURSE-2

(CC-2)-ZOO 102(A): CELL BIOLOGY AND IMMUNOLOGY

General Course Objectives:

Cell Biology Objectives:

While studying the **Cell Biology and Immunology** course, the student shall be able to:

1. Develop deeper understanding of what life is and how it functions at cellular level.
2. To study the structure and function of the basic unit of living organisms
3. Describe cellular membrane structure and function, fine structure and function of cell organelles.
4. To study stages in cell cycle (including cell death and cancer), cell differentiation, and organelles and other cellular structures in the growth and functioning of the cell (including membrane transport and signaling).
5. Perform a variety of molecular and cellular biology techniques Students will understand the structures, positions and functions of plasma membrane and all cellular organelles in details. Examine the structure and functions of cellular organelles.
6. Gather basic concepts of Cell Biology along with various cellular functions, Comparative analysis of cellular organelles.

Immunology Course Objectives:

While studying the Immunology course, the student shall be able to:

1. The students will have to understand how the immune system can fight with infection and other diseases, the strategies to improve existing vaccines and how to approach these, Cellular and molecular basis of inflammatory response, mechanisms involved in control of immune response.
2. The objective of the course is to apprise the students about components associated with immune system and molecular mechanism of their working.
3. The course also deals with implications of deregulation of basic regulatory networks that lead to immune system related disorders.
4. The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease.
5. To provide knowledge of fundamentals of immune system and immunological basis for treatment of some common diseases. Study the organs of immune system and the innate and adaptive immunity
6. To gain knowledge on antigens, antibodies and their production mechanism
7. To study the antigen antibody reactions and immunological disorders

CELL BIOLOGY:

Unit- I

1.1 Organization of Prokaryotic and Eukaryotic cell.

1.2 Membrane structure–Unit Membrane model-Fluid Mosaic Model

1.3 Membrane transport: Active transport–Passive transport–Diffusion–Osmosis–Ion channelsMembrane pumps.

1.4 Stages of Cell Cycle-Regulation of Cell Cycle

Unit-II

2.1 Structure and functions of Mitochondria –Bioenergetics

2.2 Introduction to cell Signalling-Types of Cell Signalling

2.3 G-protein coupled receptors, Tyrosine kinesis, cytokine receptors,

2.4 Pathways of intracellular signalling transduction, Ras, Raf and MAP kinases).Notch Signalling

IMMUNOLOGY

Unit-III

3.1 Cells of the immune system: Lymphoid cells, Mononuclear cells, granulocytic cells, Mast Cells

3.2 Types of Immunity –Natural Immunity-Induced Immunity Organs of the immune systemprimary and secondary lymphoid organs.

3.3 Antigens: Antigenic determinants or Epitomes, Immunogenicity, Haptens, Adjuvants

3.4 Immunoglobulin –Structure-Types of Immunoglobulin

Unit-IV

4.1 Antigen-antibody interactions: Affinity, Avidity, Cross-reactivity, precipitation reactions and Agglutination reactions and ELISA.

4.2 Autoimmunity, Auto-immunological disorders

4.3 Transplantation, Immuno-deficiency diseases

4.4 Immunization, Different types of Vaccines

Cell Biology - Course Outcomes:

1. This course develops concepts in molecular understanding of structural and functional properties of cells and various processes associated which have potential applications in molecular and biochemical research.
2. Students will understand the structures, positions and functions of plasma membrane and all cellular organelles in details. They will acquire knowledge about chromosomes and cell divisions, both mitosis and meiosis. They will also know about cell signaling and cancers.
3. They will know how to measure and stain different cell types.

4. Students would gain expertise in the ultra structural information of animal cell besides the detailed views of the cell interior revealing the various events and actions of cell at the molecular level.15
5. The study will help the students to understand the new discoveries about the structure and internal functioning of the cell due to technological improvements.
6. The study will help the students to increase powerful means of visualization in the field of cell biology.

Immunology-Outcomes:

After completion of the course, a student will be able to achieve these outcomes:

1. Learn the fundamental principles of immune response including molecular, biochemical and cellular basis of immune homeostasis.
2. The course will aid in understanding various aspects of immunological response and how its triggered and regulated.
3. The student will learn and understand the rationale behind various assays used in immune diagnosis of diseases and will be able to transfer knowledge of immunology in clinical perspective.
4. The course will aid in understanding the principles of Graft rejection, Auto immunity and Antibody based therapy.

SUGGESTED READING MATERIAL:

1. Cell and Molecular Biology by EDR De Robertis and EMR De Robertis Jr, Indian Edition, B.I. Publicaitons, Pvt. Ltd.
2. Cell Biology (Fundamentals and Applications) By Gupta/ Jangir, 2001; Agrobios, India.
3. Harpers Review of Biochemistry, Murray, Granier, Mayes and Rodwell, Lange Medical Publications, 25th Ed.
4. Human Physiology by Stuart Era Fox, W.M.C. Brown Publishers, USA 1984 or Recent Edition.
5. Immunology introductory textbook by Nandini Shetty, Wiley Eastern Ltd.
6. Kuby, J. (1998) Immunology, W.H. Freeman and Company, New York.
7. Roitt, I.,Brostoff, J. Male, D. (1999/2000) Immunology, 4th Edition. Harcourt Brace and Company Asia, Pvt. Ltd., Singapore.
8. The Cell (A Molecular Approach) by Geoffrey M. Cooper, 2nd Edn. 2000, ISBN. CO-PO Mapping.

SEMESTER – I

CORE COURSE-2

(CC-2)–ZOO 102 (B): IMMUNOTECHNOLOGY

General Course Objectives:

While studying the **Immunotechnology** course, the student shall be able to:

1. To introduce the principles and applications of Immunology in the field of Biotechnology.
2. To understand the fundamentals of Immunotechnology including antigen-antibody interactions, immune responses, and immune system components.
3. To explore the techniques and technologies used in Immunology for diagnosis, treatment, and research purposes.
4. To apply Immunotechnological concepts in various industries including healthcare, agriculture, and environmental science.
5. To analyze the role of Immunology in disease prevention, vaccination, and personalized medicine.
6. To examine the ethical and legal considerations related to Immunotechnology and biopharmaceuticals.

Unit-I

1.1 Aim and scope of Immunotechnology, Evolution of vaccination strategies, Impact of serological tests in identifying specific antibodies in immune responses.

1.2 Regulation of immune tolerance and mechanisms of self/non-self-discrimination, Interplay between the innate and adaptive immune responses in pathogen recognition

1.3 Differentiation and functions of effector memory T cells in immune memory responses, Role of marginal zone B cells in early antibody responses to blood-borne pathogens, Specialized functions of antigen-presenting cells in priming T cell responses

1.4 Role of Toll-like receptors in recognizing pathogen-associated molecular patterns (PAMPs), Antibody effector functions and complement activation pathways in immune defense

UNIT-II

2.1 Principles of Immunodiagnostics, Development of ELISA assays, Western Blotting , Role of Immunofluorescence in diagnostics.

2.2 Applications of Monoclonal Antibodies in therapy, Immunomodulators in disease management, Immunotherapeutic strategies in clinical settings.

2.3 Genetic basis of immunity in animals, Immunogenomic approaches for disease resistance.

2.4 Utilization of Immune-based sensors for environmental monitoring, Role of Biosensors in detecting pollutants and pathogens in ecosystems.

UNIT-III

3.1 Classification of Vaccines based on technology, Novel vaccine development approaches, Vaccination schedules and strategies.

163.2 Genetic components of immune responses, Impact of polymorphisms on disease susceptibility, Applications of Immunogenomic studies in personalized medicine.

3.3 Mechanisms of Immunodeficiency disorders, Pathophysiology of Allergic reactions, autoimmune disease etiology and management.

3.4 Genetic manipulation for immune system modification, CRISPR-Cas9 applications in immune cell engineering and disease models

UNIT- IV

4.1 Therapeutic Antibodies for targeted therapy, Adjuvants in vaccine formulations, Immunemodulating drugs for treatment strategies.

4.2 Immune Biomarkers for diagnostics and prognosis, Detection methods for Immunosuppressant's in therapeutic monitoring.

4.3 Compliance with Quality Control standards, Implementation of Good Manufacturing Practices in Immunotherapy, Ethical considerations in Immune-based technologies.

4.4 Personalized Immunotherapy approaches, Utilization of Immunogenomics for precision medicine, Integration of Immunoinformatics in predicting immune responses and designing novel therapies.

Course Outcomes:

1. Comprehensive understanding of Immunology principles and their applications in Biotechnology.
2. Proficiency in performing various immunological techniques for research and diagnostics.
3. Ability to analyze and interpret immune responses in different contexts.
4. Knowledge of how Immunotechnology is applied in healthcare, agriculture, and environmental sectors.
5. Understanding of the importance of Immunology in disease prevention and treatment strategies.
6. Awareness of the ethical, legal, and regulatory frameworks governing Immunotechnology.
7. Skill development in immune engineering and genetic manipulation for therapeutic purposes.
8. Profound insight into the role of Immunotechnology in personalized medicine and future healthcare trends.

SUGGESTED READING MATERIAL:

1. Immunology - A Clinical & Laboratory Manual by Richard R. Roitt.
2. Basic and Clinical Immunology by Mark Peakman and Diego Vergani.
3. Molecular Immunology by William J. Levinson.
4. Immunotechnology: Discovering Antibodies, Antigens, and Supercells by David Burke.
5. Immunology for Dummies by John T. Conner.

SEMESTER – I

CORE COURSE-3

(CC-3)–ZOO 103 (A): COMPARATIVE ANIMAL PHYSIOLOGY

General Course objectives:

While studying the **Comparative Animal Physiology** course, the student shall be able to:

1. Comparative Animal Physiology is a comprehensive subject that gives in depth knowledge of various physiological processes in the animal kingdom.
2. This course provides knowledge of animal body system functions across levels of organization, from sub cellular through organismal.
3. Course provides students comprehensive understanding of about Feeding mechanisms & Nutrition, Digestion in comparative basis, Respiration & Metabolism, Circulation of Body fluids, Patterns of Nitrogen excretion, Osmoregulation, Thermoregulation etc.
4. To provide Structure and Functional components of Muscle.
5. To provide Physiological and Biochemical basis of Bioluminiscence in animal world.
6. To provide information on Biological Rhythms and their occurrence in Animals.

Unit - I

1.1 Aim and Scope of Physiology. Physiological Functions and Principles**.**

1.2 Feeding Mechanisms and Regulation. Nutrition, Intracellular and Extracellular Digestion**.**

1.3 Comparative Physiology of Digestion.

1.4 Digestive Enzymes: Carbohydrases, Lipases and Esterases, Proteinases, Other Digestive enzymes, Absorption.

Unit - II

2.1 Types of Respiration, Respiratory organs and Mechanism of Respiration.

2.2 Body Fluids and Circulation of body fluids.

2.3 Nitrogenous Waste Products and Patterns of Nitrogen Excretion among different animal groups.

2.4 Osmoregulation in different animal groups and different Environments.

Unit - III

3.1 Thermoregulation: Temperature as an Environmental Factor. Temperature Regulation in Poikilothermic animals.

3.2 Temperature Regulation in Homeothermic animals - Physiological changes, Counter current heat exchange mechanism, Grouping, huddling, basking, Seasonal migration in animals, ectothermic animals.

3.3 Hibernation and Aestivation: Metabolic and physiologic changes, Evolutionary perspectives

3.4 Biological Rhythms: Circadian, Ultradian, Infradian and Circannual rhythms, Mechanisms and external cues, Seasonal affective disorders.

Unit - IV

4.5 Bioluminescence – Occurrence of bioluminescence among different animals. Mechanism of light production, Control of bioluminescence, Functions of luminescence.

4.6 Chromatophores and Regulation of their function - Color production, Chromatophores pigment. Mechanism of action of Chromatophores. Movement of pigment. Control of Chromatophores. Factors influence in Chromatophores System.

4.7 Contractile elements: Cell, and Tissues among different phylogenetic groups.

4.8 Muscle Structure and function - Correlation.

Course Outcomes:

After going through this course of **Comparative Animal Physiology**, the students have a good understanding of:

1. How Invertebrates and Vertebrate animals work and how these animals biology is influenced by the different environments of their niches.
2. The students will be able to explore an original query in Animal Physiology. The students will appreciate evolutionary changes and environmental adaptations in different taxa of Invertebrates and Vertebrates.
3. An appropriate understanding of functioning of each system of different groups of animals with their comparison will be acquainted.
4. Understanding of the basic concepts of Physiological regulation, from cellular to organ to organismal.
5. Understanding of how different groups of animals have different Physiological adaptations appropriate to carry out the required function.
6. Appreciation of the gorgeous diversity of Physiological possibilities that animals have developed through natural selection.

SUGGESTED READING MATERIAL:

1. C. L. Prosser. Comparative Animal Physiology. W.B. Saunders and Company.
2. R. Eckert. Animal Physiology. Mechanisms and Adaptation. W. H. Freeman &Company.
3. W. S. Hoar. General and Comparative Animal Physiology.
4. Schiemdt-Nielsen. Animal Physiology. Adaptation and Environment. Cambridge.
5. C. L. Prosser. Environment and Metabolic Physiology Wiley-Liss, New York.
6. EJ.W. General and comparative Endocrinology, Cambridge Press, Oxford.
7. Bentley, PJ. Comparative Vertebrate Endocrinology, Cambridge Press, Oxford.
8. Williams, R.H. Textbook of Endocrinology, W.B. Saunders Co., Philadelphia.
9. Martin, C.R.Endocrine Physiology. Oxford Univ. Press, Oxford.
10. Prakash S. Lohar. Endocrionology-Hormones and human health-2005.MJP Publishers- Chennai

SEMESTER – I

CORE COURSE-3

(CC-3)–ZOO 103 (B): ENDOCRINOLOGY

General Course objectives:

While studying the **Endocrinology**, the student shall be able to:

1. Understand the principles of hormonal diagnosis and feedback mechanisms in endocrinology, with a focus on diseases of the hypothalamus and the pituitary gland.
2. Identify and analyze various endocrine disorders, including hypothalamic syndromes, diseases of the adenohypophysis, and hormonally active and inactive tumors such as prolactinoma and acromegaly.
3. Evaluate the clinical presentation, pathogenesis, and forms of hypopituitarism, including isolated forms like hyposomatotropism and hypogonadism, to differentiate and diagnose these conditions.
4. Discuss the regulation and biological effects of hormones of the adrenal cortex, hyperfunction conditions like Cushing's disease, and congenital adrenal hyperplasia, focusing on clinical presentation and differential diagnosis.
5. Examine disorders of carbohydrate metabolism and the endocrine pancreas, including diabetes mellitus, metabolic syndrome, and thyroid diseases, to understand etiology, classification, clinical presentation, diagnosis, and treatment options.
6. Explore the relationship between endocrinology and reproduction, delving into endocrine gland functions, hormone actions, and reproductive processes to comprehend neuroendocrine regulation and its significance in fertility and overall health.
7. These course objectives aim to guide students in mastering the fundamental concepts, principles, and clinical applications of endocrinology, enabling them to diagnose, treat, and manage a variety of endocrine disorders effectively.

Unit - I

1.1. Definition of Endocrinology. Historical Perspective on Endocrinology; Milestones in Endocrinology Research; Early Discoveries of Hormones and Endocrine Glands

1.2. Importance of the Endocrine System in Organisms.

1.3. Classification of Hormones, Endocrine Glands and Hormonesin the Human Body.

1.4 Amine Hormones; Functions of Key Hormones: Insulin, Cortisol, Thyroxine, etc.

Unit - II

2.1. Mechanisms of Hormone Synthesis; Biosynthesis of Peptide Hormones; Synthesis of Steroid Hormones in Endocrine Organs.

2.2. Regulation of Hormone Secretion; Control of Hormone Release by Hypothalamic-Pituitary Axis; Circadian Rhythms and Hormone Secretion.

2.3. Feedback Mechanisms in Endocrine Regulation; Negative Feedback Loops in Hormone

Regulation; Positive Feedback Mechanisms in Endocrine Systems.

202.4. Role of Neuroendocrine System; Neurotransmitters and Neuropeptides in Endocrine Signaling.

Unit - III

3.1. Endocrine Disorders: Causes and Symptoms; Genetic and Environmental Factors in Endocrine Disorders; Common Symptoms of Endocrine Dysfunction; Diagnostic Techniques for Endocrine Disorders.

3.2. Diabetes Mellitus: Types and Management; Pathophysiology of Type 1 and Type 2 Diabetes; Treatment Strategies for Diabetes Mellitus.

3.3. Thyroid Disorders: Hypo and Hyperthyroidism; Thyroid Hormone Synthesis and Regulation; Causes and Symptoms of Hypothyroidism and Hyperthyroidism.

3.4. Adrenal Disorders: Cushing's Syndrome and Addison's Disease; Role of Adrenal Glands in Endocrine Function.

Unit - IV

4.1. Hormonal Control of Reproduction; Role of Gonadotropins in Reproductive Endocrinology; Mechanisms of Puberty and Menopause.

4.2. Menstrual Cycle and Ovarian Hormones; Phases of the Menstrual Cycle: Follicular, Ovulatory, and Luteal; Ovarian Hormones: Estrogen and Progesterone.

4.3. Testicular and Prostate Hormones in Males, Testosterone Synthesis and Function in Males; Androgen Receptor Signaling in Male Reproductive System.

4.4. Infertility and Assisted Reproductive Technologies; Causes of Male and Female Infertility.

Course Outcomes:

After completion of the course, a student will be able to achieve these outcomes:

1. Understand the structure, function and regulation of endocrine & neuro-endocrine glands,
2. Develop a deep knowledge of the role of endocrine secretion in regulation of reproductive Cycle
3. Understand the pathways associated with Biosynthesis and secretion of Endocrine hormones and their role in the control of metabolism.
4. Acquiring the knowledge of signal transduction mechanisms.
5. Through understanding of several endocrines including Peptide hormones, Steroid hormones, Pituitary hormones, Sex hormones, Thyroid hormones etc in the control of metabolic pathways
6. Understanding the influence of hormones on Growth, Development and Reproduction and their regulatory pattern.

SUGGESTED READING MATERIAL:

1. Barrington. EJ.W. General and comparative Endocrinology Cambridge Press, Oxford.
2. Bentley, PJ. Comparative Vertebrate Endocrinology, Cambridge Press, Oxford.
3. Martin, C.R. Endocrine Physiology. Oxford Univ. Press, Oxford.
4. 214. Prakash S. Lohar. Endocrionology-Hormones and human health-2005. MJP PublishersChennai.
5. Williams, R.H. Text Book of Endocrinology, W.B. Saunders Co., Philadelphia.

SEMESTER – I

SKILL ORIENTED COURSE-1

(SOC-1)-ZOO 105 (A): BIOANALYTICAL TOOLS AND TECHNIQUES-I

General Course Objectives:

While studying the Bioanalytical Tools & Techniques, the student shall be able to:

1. To study the different acid and base conditions and their effect on the biomolecules in biology and research.
2. To learn about the separation of biomolecules through apply the different centrifugal force.
3. To study different types of chromatography used in biology.
4. To learn about different molecular and cellular separation techniques and their application in biological research.
5. To study principles and methods of different spectroscopic techniques.
6. To know the principle and types of different microscopes

Unit - I

1.1 Molarity and Normality. Measurement of pH, Biochemical buffers.

1.2 Cell disruption methods – French press, Sonication, Freeze-thaw techniques, Enzymatic method, use of Liquid Nitrogen in Cell disruption.

1.3 Aseptic techniques-Dry sterilization, Wet sterilization, Fumigation, HEPA

1.4 Isolation of bacteria- Gram staining, enumeration of soil bacteria, glycerol stocks

Unit – II

2.1 Centrifugation - Basic principles of sedimentation, types of centrifuges and rotors.

2.2 Preparative Ultracentrifugation – Differential centrifugation, density-Gradient, Analytical Ultra Centrifugation and its Applications.

2.3 Separation methods - General Principles and definitions.

2.4 Chromatography & Types: Paper Chromatography, Thin layer Chromatography, Column Chromatography

Unit – III

3.1 Electrophoresis – General principles and definitions of PAGE, Native PAGE& SDS-PAGE

3.2 Agarose gel Electrophoresis: Preparation, Separation and determination of molecular size of DNA, denaturing agarose gel electrophoresis and their applications,

3.3 Recovery of DNA from Agarose gels.

3.4 Blotting techniques - Western, Southern and Northern.

22**Unit - IV**

4.1 Radioisotope techniques – Types of isotopes, radioactive decay. Detection and Measurement of Radioactivity.

4.2 Isotopes used in biology, safety methods in handling Radioisotopes.

4.3 Tools and Techniques in histology: Principles, design and functioning of microtomes, Sample preparation, fixatives and types.

4.4 Processing of tissues: dehydration, embedding, block making, staining, dyes and dye binding reactive groups, mordants and mordanting, temporary and permanent preparations.

Course Outcomes:

1. Students would be trained the different acid and base conditions and their effect on the biomolecules in biology and research.
2. To learn about the separation of biomolecules through apply the different centrifugal force.
3. Students would be expertise different molecular and cellular separation techniques and their application in biological research.
4. Students would be trained in various tools and techniques used to gain insight into biological processes.
5. Students would be expertise techniques used for imaging, isolation, purification and characterization of various biological substances.
6. Students would gain basic knowledge of the underlying principles and practical strategy of the analytical and preparative techniques that are fundamental to study and understanding of life processes.
7. Identify and describe the different equipment and tools used in a biology laboratory.
8. Correctly operate different laboratory instruments.
9. Identify and Analyse the spectra of biomolecules
10. Isolate and purified the biomolecules through chromatography

SUGGESTED READING MATERIAL:

1. A Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
2. Animal Cell Culture – A practical approach, Ed.John. R. W.Masters IRL Press.
3. General Zoological Microtechniques - P.M. Weesner.
4. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker, VIII volume, Cambridge press Edition.
5. Principles of Neuro Phychopharmacology- Robert S. Feldman, Jerrold S. Meyer and Lind F. Quenzer. Sinauer Associates, Inc. Publishers. Sunderland. Massachusetts.
6. Biophysical chemisty by Upadhyay – Upadhyay - Nath.
7. Analytical Biochemistry (Biochemical techniques) by Dr P. Asokan. Chinnaa publications.
8. Introduction to Instrumental analysis, Robert Braun. McGraw Hill International Edition.
9.

SEMESTER – I

SKILL ORIENTED COURSE-1

(SOC-1)-ZOO 105 (B): HISTOLOGY AND HISTOCHEMISTRY

General Course Objectives:

While studying the **Histology and Histochemistry**, the student shall be able to:

1. To study the structural organization of different mammalian tissues at the histological level. Understand the types and causes of morphological alterations in cells due to diseases. Comprehend the relationship between etiology, pathogenesis, and histopathological changes in specific diseases.
2. To study the process of permanent slide preparation, immunofluorescence technique, and mechanism for the Identification of total Proteins and Glycoproteins.
3. To study Explain morphological alterations in cells due to diseases, such as cloud, hyaline, hydrophic, and fatty degeneration.
4. To study Review the application of immunohistochemistry and immunofluorescence techniques to localize proteins in endocrine cells (Pituitary cell types or islet of Langerhans).
5. To study Specify and compile applications of Cryotechniques, Cryo ultramicrotomy, microscope, Importance of Enzyme histochemistry, Application of Histochemical methods for the detection of various types of Carcinoma Immunofluorescent techniques.

Unit - I

1.1 Histology : Histochemistry and Histopathology : Objectives and applications

1.2 Tissues: Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue.

1.3 Muscle: Histology of different types of muscle (skeletal muscle, smooth muscle, cardiac muscle).

1.4 Functional Morphology (mammalian) : Histological organization of GI tract- stomach and intestine, lungs, kidney, spleen, thymus, Bone and bone marrow.

Unit - II

2.1 Endocrine System: Histology of mammalian endocrine glands-pituitary, thyroid, parathyroid, pancreas, adrenal gland, testis, ovary.

2.2 Nervous System: Types, structure and function of brain cells (CNS and PNS) and Structure of neuron. Types of synapse, Synaptic transmission and structure and types and functions of bones and cartilages.

2.3 Tissue fixation: Objectives, methods, chemical fixatives-types and chemistry of fixation; Physical methods-:freezing and microwave fixation; choice of fixatives, fixation artifacts.

2.4 Classification and properties of dyes; metachromatic dyes and staining.

Unit - III

3.1 Histochemistry Principles and methods of application

3.2 Utility of classical histochemical Techniques: for localization of glycoproteins (PAS),

nucleic acids (Feulgen) and steroid dehydrogenase activity.

3.3 Immunohistochemistry Principles, method of application of Imunohistochemistry

3.4 Immunofluorescence techniques for localization of proteins in endocrine cells (Pituitary cell types or islet of Langherhans) In situ hybridization of nucleic acids.

Unit-IV

4.1 Histopathology : Morphological alterations in cells due to disease, types of degeneration clouding, hyaline, hydrophic and fatty degeneration.

4.2 Etiology, pathogenesis and histopathology of Liver cirrhosis and atheroscelerosis, Neuropathology of alcoholism and methanol poisioning.

4.3 Histopathology Tumors- malignant and non-malignant, types of carcinoma, histopathology of breast and prostate tumors.

4.4 Histochemical classification of Proteins Principles and mechanism for the Identification of Total Proteins and Glycoproteins.

Course Outcomes

1. Explain the structural organization of different mammalian tissues at the histological level. Understand the types and causes of morphological alterations in cells due to diseases.
2. Comprehend the relationship between etiology, pathogenesis, and histopathological changes in specific diseases.
3. Illustrate the process of permanent slide preparation, immunofluorescence technique, and mechanism for the Identification of total Proteins and Glycoproteins.
4. Explain morphological alterations in cells due to diseases, such as cloud, hyaline, hydrophic, and fatty degeneration.
5. Review the application of immunohistochemistry and immunofluorescence techniques to localize proteins in endocrine cells (Pituitary cell types or islet of Langerhans).
6. Specify and compile applications of Cryotechniques, Cryoultramicrotomy, microscope, Importance of Enzyme histochemistry,
7. Application of Histochemical methods for the detection of various types of Carcinoma Immunofluorescent techniques.

SUGGESTED READING MATERIAL:

1. Boyd,W. 1976:A text book of Pathology. Structure and function in disease, 4 th edition. Lea and Fibiger, Philadephia.
2. Pearse, A.G.E. (1980): Histochemistry, theoretical and Applied ,J& A, Churchill Ltd., London.
3. Rogers, A.W.(1983): Cells and Tissues, An introduction to Histology and Cell Biology, Academic Press, NY.
4. Telford, I.R. and Bridgman,C.F.(1990). Introduction to Functional Histology, Harper and Row, NY

SEMESTER – I

SKILL ORIENTED COURSE-2

(SOC-2)-ZOO 106 (A): POULTRY SCIENCE AND MANAGEMENT

General Course Objectives:

While studying the **Poultry Science and Management**, the student shall be able to:

1. The learn about varieties of different poultry birds for cultivation
2. To know about different types of diseases in poultry.
3. To develop human resource in Poultry farming.
4. Gain knowledge about various rearing management systems study of Poultry birds.
5. It will impart knowledge in Poultry industry, Farming, Breeding, Housing, Nutrition, disease and Management

Unit - I

1.1 Poultry Industry and Biology: History of Poultry industry in India. Role of Egg and Meat in Human nutrition. Poultry manure and byproducts.

1.2 External features – Digestive and Reproductive system – Egg formation Feather sexing – Feather tracts.

1.3 Breeds of Layers and Common Broilers: Common Poultry birds – choosing commercial laying stock–Egg laying breeders– Leghrons and Anconas; Table breeds or Broilers Sussex and Darking;

1.4 Production of commercial laying stock – Pure line strain and Strain crosses, Breed crosses and inbred crosses; sexing in one day old chicks – Colour sexing, Vent sexing and Feather sexing.

Unit - II

2.1 .Poultry Housing: Location of the Farm–Construction of Poultrysheds–Poultryhousing–1+3system and its advantages;

2.2 Deep litter system – Litter Management, Advantages, and disadvantages.

2.3 Dropping pit, Nest Boxes, Feeder and Waters Cage Rearing for Layers – Californian cages, Feeder, Waterers.

2.4 Management of Cage birds – Advantages and Disadvantages of Cage rearing.

Unit - III

3.1 Poultry Nutrition: Energy – Carbohydrates – Fats – Proteins – Vitamins – Minerals.

3.2 Feed stuff, Feed formulation – non-nutritive feed additives.

3.3 Feed grinder – homemade mineral mixture of feed for chick – grower – layer – broiler and finisher

3.4 Nutrition deficiency Diseases – Vitamin deficiency diseases A, E and D. Essential inorganic elements – Calcium, Phosphorus, Sodium, Potassium, Magnesium, Manganese, and Iodine.

Unit - IV

4.1 Rearing and Management: Practical aspects of Chick rearing - Brooding Lighting Programme, Debeaking and forced Moulting.

4.2 Management of Growers, Layers, and Broilers; Seasonal and Intergrated Management of Poultry bird – Summer Management and Winter Management.

4.3 Diseases and Control Measures: Bacterial (Infectious coryza), Viral (Newcastle, birdflu), Fungal (Mycotoxicosis) and Parasitic (Coccidiosis) – Transmission, Symptoms & Treatment.

4.4 Vaccination –Antibodies – Nutritional deficiencies.

Course Outcomes:

1. Students will understand about poultry farming and poultry development.
2. Students would gain Knowledge about modern breeds of chicks.
3. Students will understand about structural anatomy of birds and different poultry birds in India.
4. Students learn about different poultry birds in India.
5. Gains knowledge about egg embryo development and endocrine regulation of development.
6. To understand feeding types and poultry nutritional status of feed.
7. To understand overall poultry farming and feed formulation.

SUGGESTED READING MATERIAL:

1. Singh,R.A.,2011.Poultry Production.3rd Edition, Kalyani Publishers, New Delhi.
2. Jull,A.,Morely,2007.Succesful Poultry Management.2Edition, Biotech Books, New Delhi.
3. Hurd M. Louis, 2003. Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow.
4. Ensmiger, M.E.,2015.PoultryScience.3rdEdition,International Book Distribution Co., Lucknow, India.
5. Bell,D.Donald and WeaverD WilliamJr.2007.Commercial chicken meat and egg production. 5th Edition. Springer India Pvt. Ltd., Noida.

SEMESTER – I

SKILL ORIENTED COURSE-2

(SOC-2)-ZOO 106 (B): ECONOMIC ZOOLOGY

General Course Objectives:

While studying the Economic Zoology course, the student shall be able to:

1. Identify various Methodologies and Perspectives of applied branches of Zoology for the possibilities of Self-employment.
2. Study the economic importance of Sericulture, Apiculture, and Animal husbandry.
3. Learn the technical practices of Aquaculture, Sericulture, Apiculture, and Animal husbandry technologies.
4. Gain understanding of disease management technologies and their adaptation in Fisheries, Apiculture, Sericulture, Poultry, etc.

Unit – I

1.1 Introduction to Aquarium Fish Keeping, potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes.

1.2 Biology of Aquarium Fishes, common characters, and sexual dimorphism of Freshwater and Marine Aquarium fishes, live fish feed organisms.

1.3 Fish Transportation and Aquarium Maintenance, Live fish transport, packing, and forwarding techniques.

1.4 General Aquarium maintenance, budget for setting up an Aquarium Fish Farm as a Cottage Industry.

Unit – II

2.1 History, scope, andprospective status of Sericulture Industry in India.

2.2 Species of silkworm, life history of mulberry silkworm and tasar silkworm.

2.3 Silk worm diseases, Entrepreneurship in sericulture.

2.4 Economic Prospects: Overview of economic opportunities and challenges in the Sericulture Industry.

Unit – III

3.1 Historical background of Vermicompost

3.2 Different methods of Vermiculture

3.3 Advantages and economic importance of Vermiculture, Vermicompost

3.4 Problems involved in Vermicompost

Unit – IV

4.1 Lac culture – Lac insect, Lacciferalacca, life cycle, Lac processing, Lac products, Economic Importance.

4.2 Pearl culture and Pearl Industry.

284.3 Economics of Poultry keeping, Morphology of different breeds of Chicken, Brooding and Rearing of Chicks, Egg and Meat processing in Poultry.

4.4 Dairy farm management, Milch, Draught, Dual-purpose breeds of Cows and Buffaloes in India.

Course Outcomes:

After completing Economic Zoology, the student will be able to:

1. Explore various concepts and the importance of Economic Zoology.
2. Create self-employment opportunities for rural students through Animal husbandry, Aquaculture, and Sericulture.
3. Understand the significance of economically important animals including cultivable Fishes, Prawns, and their culture practices.
4. Identify animal pathogenic diseases in Fisheries, Sericulture, Apiculture, Aquaculture, and their management strategies.
5. Introduce technologies pertaining to Pearl culture, Poultry keeping, dairy farm management.

SUGGESTED READING MATERIAL:

1. "Economic Zoology" by G.S. Sukla and V.B. Upadhyay.
2. "A Handbook on Economic Zoology" by Jawaid Ahsan and Subhas Prasad Sinha.
3. "Economic and Applied Entomology" by Ashok Kumar and Prem Mohan Nigam.
4. "Applied Fisheries" by Q.J. Shammi and S. Bhatnagar.
5. "Ponds and Fish Culture" by Major Hall, C.B.
6. "A Handbook of Poultry Practice" by Keith Wilson, N.D.P.
7. "Poultry" by G.C. Banerjee.
8. "A Text Book of Animal Husbandry" by G.C. Banerjee.
9. "Trends in Livestock Research" by S.K. Kaushish.
10. "Vermicology the Biology of Earthworm" by S.A. Ismail.
11. "Vermitechnology" by A. Mary Violet Christy.

SEMESTER – I

OPEN ONLINE TRANSDISCIPLINARY COURSE – 1

(OOTC-1) ZOO 108

*Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,

SEMESTER – I

AUDIT COURSE – 1

(AC-1)-ZOO 109: INDIAN KNOWLEDGE SYSTEM-1

Audit Course – Zero Credits

AUDIT COURSE -109- INDIAN KNOWLEDGE SYSTEMS

Learning Objectives:

1. To study the enriched scientific Indian heritage.
2. To understanding of Indian Knowledge System.
3. Develop an ability to apply the Indian Knowledge System to societal challenges faced today in areas

such as holistic health, governance, public administration and sustainable living.

Learning Out comes:

1. After completion of study, students able toClassify the key concepts of Indian Knowledge System and discuss the multi-faceted nature of
2. knowledge contained in the Traditional Systems of India.
3. Identify the importance of Yoga way of living in maintaining a sound physical, emotional and mentalhealth.
4. Recognize the relevance of Arthashastra in public administration and effective governance.

SYLLABUS

Unit I:

Introduction to Indian Knowledge Systems (IKS): About Indian Knowledge System; Definition of Indigenous/ Traditional Knowledge; Scope, and Importance of Traditional Knowledge.

Unit II :

Indian Heritage of Knowledge: Ancient Indian Knowledge: The Vedas and its components-the Vedangas Ancient Indian books and treaties: The Sastras.; The Great Indian Epics: The Ramayana and The Mahabharata Epics and

religious treaties.

Unit III :

Ancient India- Bharat Varsha: People of Ancient Bharat Varsha; Our great natural heritage: The great Himalayas and the rivers; The civilizations of the Sindhu-Ganga valley, and the Brahmaputra valley; Our coastal plains; Our Nature: Forests and Minerals; Ancient Indian Traditional Knowledge and Wisdom about nature and climate.

Unit IV:

Contribution of Ancient India to Health Sciences: Traditional Indigenous systems of medicines in India: - Ayurveda and Yoga; Elements of Ayurveda: Gunas and Doshas, Pancha Mahabhuta and Sapta-dhatu; Concept of disease in Ayurveda; Ayurvedic lifestyle practices: Dinacharya and Ritucharya; Important Ayurvedic Texts; Hospitals in Ancient India; Ayurveda: Gift of India to the modern world.

Reference Books:

1. Baladev Upadhyaya, Samskrta Śāstrom ka Itihās, Chowkhambha, Varanasi, 2010.
2. D. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., A Concise History of Science in India, 2nd Ed.,Universities Press, Hyderabad, 2010.
3. Astāngahrdaya, Vol. I, Sūtrasthāna and Śarīrasthāna, Translated by K. R. Srikantha Murthy, Vol. I,Krishnadas Academy, Varanasi, 1991.
4. Dharampal, The Beautiful Tree: Indian Indigenous Education in the Eighteenth Century, DharampalClassics Series, Rashtrotthana Sahitya, Bengaluru, 2021.
5. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavan RN. (2022), Introduction to Indian KnowledgeSystem: Concepts and Applications. PHI Learning Private Ltd.
6. Mukul Chandra Bora, Foundations of Bharatiya Knowledge System. Khanna Book Publishing.
7. D. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., A Concise History of Science in India, 2nd Ed.,Universities Press, Hyderabad, 2010.

M.Sc., ZOOLOGY

(Effective from the batch of Student admitted during the Academic year 2024-25)

SEMESTER – II

CORE COURSE-4

(CC-4) ZOO 201: GENETICS AND EVOLUTION

General Course Objectives:

While studying the **Genetics and Evolution**, the student shall be able to:

1. The course provides an insight into the life processes at the subcellular and molecular levels.
2. Other important aspects include DNA and molecular genetics including gene cloning.
3. The origin of life and the related evolutionary processes.
4. The evolutionary theories and the process of species formation will be elaborated in view of the natural selection process.

GENETICS

Unit – I

1.1 Concept of Gene: Allelles, Multiple alleles (Characters, symbolism, ABO blood grouping, Bombay Phenotype and Rh factor), Pseudo alleles. Interaction of genes: (Lethal genes, Complementary genes, duplicate genes).

1.2 Genome organization in Prokaryotes and Eukaryotes. Microbial genetics: Methods of genetic transfers (Transformation, Conjugation, Transduction and Sexduction), Human Genome – Heirarchy and Classification.

1.3 Gene mapping methods: Linkage – complete and incomplete linkage; Linkage maps, Recombination, mapping with molecular markers, somatic cell hybrids.

1.4 Crossing over: Types (Somatic or mitotic crossing over and Germinal or meiotic crossing over), Theories about the mechanism of crossing over, tetrad analysis, and cytological detection of crossing over.

Unit – II

2.1 Mutations: Types (Spontaneous and Induced), Mutant types (Lethal, Conditional, biochemical, Loss of function, Germinal versus somatic mutants), Molecular basis of Mutations. Causes and Detection.

2.2 Chromosomal aberrations (Deletion, Duplication, Inversion and Translocation, Ploidy and their genetic implications). Autosomal abnormalities (Down's Syndrome, Trisomy – 13, -18); Sex Anomalies (Turner's syndrome, Klinefelter's Syndrome, Hermaphroditism).

2.3 Human Genetics: Pedigree analysis – gathering family history, pedigree symbols, construction of pedigrees. Human traits – (sex linked inheritance, sex limited and sex influenced traits) MIM number. Genetic disorders – Monogenetic disease, triplet repeat

based disorders, inborn metabolic errors & disorders of haemopoietic systems.

2.4 Eugenics: Positive Eugenics (Artificial insemination and sperm banks) and Negative Eugenics (consanguinity, genetic counselling); Euphenics: (Intake of missing enzyme, cure for inherited anemia, Increasing role of genetics to medicine).

EVOLUTION

Unit – III

3.1 Evolutionary Time scale. Chemical origin of life.

3.2 Darwinism, Neo Darwinism, Lamarkism.

3.3 Isolation – definition, types – Role of isolation mechanisms.

3.4 Models of speciation (Allopatric, Sympatric and Parapatric)

Unit – IV

4.1 A detailed account on destabilizing forces (i) Natural Selection (ii) Mutation (iii) Genetic Drift (iv) Hardy Weinberg law.

4.2 Phylogenetic gradualism & punctuated equilibrium, Gene evolution and phylogeny.

4.3 Micro, Macro evolution and Mega evolution.

4.4 Gene Evolution and Phylogeny; Evolution of Man, origin of Man, special features of primates.

Course Outcomes:

On successful completion of this course, students will be able to

1. Demonstrate knowledge of Concept of Gene, Genome organization, Gene mapping and types of Crossing Over.
2. Understand the mutations, Pedigree Analysis, Eugenics and Euphenics.
3. Demonstrate the Evolutionary time scale, Concepts of Darwinism, Isolation and Models of Speciation.
4. Gain the knowledge of Population Genetics and Molecular Evolution

SUGGESTED READING MATERIAL

1. Genetics - MonrveW. Strickberger. 3 rd Ed., May, 2000.
2. Genetics- K. B. Allluwallia-1985.
3. Principles of Genetics - EJ. Gardner. MJ. Simmons & D.P. Snustad.
4. Molecular Biology of genes - Watson, J. D., N. H. Hopkins, J. W. Roberts, J. A. Steitz & A. M. Weiner. The Benjamin Cummings publishing company. Inc. Tokyo.
5. Basic Human Genetics - EJ. Mange, Arthur P. Mange. Indian Print, 1997.
6. Genetic disorders of Man by M. R. Good man.
7. An introduction to modem genetics by Ch. Waddinsgton.
8. Dobzhansky, Th., F.J. Ayala, GL. Stebbin and J.M. Valentine volution: Surjeet publications, New Delhi latest edition.
9. P.A. Moody Introduction to Evolution II ed/latest: Kalyani publishers, New Delhi

SEMESTER – II

CORE COURSE-5

(CC-5)-ZOO 202(A): BIOMOLECULES: STRUCTURE AND FUNCTION

General Course Objectives:

While studying the **Biomolecules: Structure and Function** course, the student shall be able to:

1. The course provides an introduction to the structure of biomolecules
2. To provide knowledge about the structure and function of Carbohydrates ,proteins and Lipids.
3. To understand the concepts of Protein folding and forces responsible for protein stability.
4. To gain knowledge about Ramachandran plot.
5. To understand the structure and types of DNA and RNA.

Unit - I

1.1 pH,acids, bases, buffers, chemical bonding, properties of water

1.2 Carbohydrates- classification and properties of carbohydrates, monosaccharides, disaccharide, polysaccharides-Structure and function.

1.3 Lipids – Classification, structure and biological function of fatty acids, glycolipids, triacylglycerols, phospholipids.

1.4 Physico-chemical properties and analysis of fats and oils.

Unit – II

2.1 Amino acids – Classification, Essential and non-essential amino acids

2.2 Biosynthesis of non-essential amino acids.

2.3 Acid-base titrations of amino acids. Physical and chemical properties of amino acids.

2.4 Structure of peptides and types – Properties of peptides. Peptide synthesis by solid-phase technique.

Unit - III

3.1 Proteins-classification, isolation of protein.

3.2 Structure of proteins-primary, secondary, tertiary and quaternary structure of proteins.

3.3 Protein folding –Forces and bonds responsible for protein stability, Ramachandran Plot

3.4 Denaturation and Renaturation of proteins –Structure and function of glycoproteins and lipoproteins.

Unit – IV

4.1 Nucleic acids – structure of purines, pyrimidine, nucleosides and nucleotides,Differences between DNA and RNA

4.2 Structure of DNA-Watson and Crick double helix structure.

4.3 Different forms of DNA (A, B and Z forms), Chargoff's rule.

4.4 Structure and types of RNA (mRNA, rRNA, tRNA). denaturation and renaturation of nucleic acids cot curves.

Course out Comes:

On successful completion of this comes students will be able to

1. Understand the importance of Carbohydrates and Lipids.
2. Demonstrate Knowledge of Aminoacids
3. Gain the Knowledge of Protein structure.
4. Understand the concepts in the structure of DNA&RNA.

SUGGESTED READING MATERIAL

1. Textbook of Biochemistry. West and Todd. 1968. Mac Millan, New York.
2. Principles of Biochemistry. Lehninger, A. L. 1993. C. B.S., India.
3. Biochemistry. Voet, D and J. Voet. 1995. 2nd Edn. 1995. John Wiley and Sons, USA.
4. Harper's Biochemistry. Murray, R. K., D. K. Granner, P. A. Mayes and V. W. Rodwell. 2002. Mc Grew Hill Publishing Company, New Delhi.
5. Biochemistry. Berg, J. M., L. J. Tymcozko and L. Stryer, 2002. 5th Edn. W. H. Freeman and Company, New York.
6. Textbook of Biochemistr y with Clinical Correlation. Devlin, T. M. 1997. 4th Edn. Wiley-Liss, New York.
7. Introductory Practical Biochemistry. Sawhney, S. K and R. Singh. 2001. Narosa Publishing House. New Delhi.
8. Biochemistry. Lehninger. A.L. 1978. 2n d Edn. Kalyani Publishers, New Delhi.

SEMESTER – II

CORE COURSE-5

(CC-5)–ZOO 202 (B): NEUROBIOLOGY AND ETHOLOGY

General Course Objectives:

While studying the Neurobiology and Ethology course, the student shall be able to:

Neurobiology:

1. To study the micro-anatomical structure of neuron
2. To describe the different types of Neurons and their organization
3. To understand the Molecular mechanism of transmission
4. To study the chemical composition of Nervous system
5. To understand the principles of different types of neurotransmitters

Ethology (Animal Behavior):

1. To study the types of perception in animal behaviour
2. To study the patterns of social organization of Primates and Insects.
3. To know about the Animal aggressive behaviour and homing territoriality
4. To study in depth the patterns of Learning and Memory

Unit – I

1.1 Micro anatomy of neurons and types of nerve cells, organisation of central nervous system (spinal cord, Brain stem and cerebral cortex).

1.2 Types of cranial & Spinal nerves their association to the different organs of the human.

1.3 Bioelectrical properties of neurons-Neuronal excitability; the resting membrane potential, Sodium and potassium pump, Generation of action potentials.

1.4 Synapse; structure and integration; Morphology of the synapse; Types of Synapses, Ultra structure of synapse, chemical transmission and Electrical transmission.

Unit – II

2.1 Chemical composition of the nervous system - cerebrospinal fluid - CNS barriers

2.2 Synthesis, Storage, release and mechanism of Acetylcholine

2.3 Synthesis, Storage, release and mechanism of Catecholamines including Epinephrine, Norepinephrine, Dopamine.

2.4 Neurodegeneration disorders; Alzheimer's disease, Parkinson's disease and schizophrenia

UNIT- III

3.1 General introduction: An overview of concept of Animal behaviour

3.2 Visual Perception, Auditory perception and Olfactory Perception

3.3 Animal aggression and Homing territoriality

3.4 Social organization, Advantages, Social organization in insects, primates.

Unit – IV

4.1 Conditioning Learning (Classical and Operant conditioning and Multiple-response learning)

4.2 Cognitive Learning (Insight Learning, Sign Learning, Latent Learning)

4.3 Kinds of remembering (Red integrative memory – Recall – Recognition - Relearning - Retrieval process - Theories of Memory).

4.4 The nature of forgetting (Decay through disuse - Interference effects, motivated forgetting, Improving memory)

Course Outcomes:

Neurobiology:

1. Learnt about structure, function and organization of Neurons in the Central nervous system.
2. Understanding Electrophysiological techniques and Molecular mechanisms associated with action potentials.
3. Students leant and gain knowledge on structure and function of different types of Synapses.
4. Gained information on different types of Neurotransmitters i.e. Amino acids and Peptides.

Ethology (Animal Behavior):

1. Acquired knowledge on types of perception in different Animals and their importance
2. Understand the overview of Animal Behavior and prominence of social organization in insects and primates.
3. Gained lot of information on different types of Learning phenomenon and their mechanisms

SUGGESTED READING MATERIAL:

1. Basic Neurochemistry - G.J. Siegal, RW. Albers, B.W. Agranoff, R Katzman (1981); Little, Brown and company, Boston.
2. Introduction to Nervous system-T.H.Bullock, RCork, A.Granner (1977); W.H Freeman& Co.
3. Mechanism of Drug Action on the Nervous System - M.A.B. Brazil, RW. Ryall (1979); Cambridge University Press, Cambridge, London and New York.
4. Neuroanatomical Techniques - N.J. Stransfed and T.A. Miller, Springer Verlag.
5. Neurobiology - Shepherd, G.M., Oxford University Press, London.
6. Principles of Neural Science - E.R Kandel and J.H. Schwertz (1981); Elsevier North Holland, NY, Oxford.
7. Principles of Neuropsycho pharmacology - Robert S. Feldman, Jerrold S. Meyer and Lind F. Quenzer, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
8. The Biochemical basis of Neuropharmacology - J.R Cooper, F.E. Bloom, & RH. Roth (1982); Oxford University Press, NY and London, York Heidelberg, Berlin, 1980.
9. Alcock, J., Animal Behaviour: An evolutionary approach, Sinauer Assoc., Sunderland, Mass., USA.
10. Bradbury, lW. and S.L. Vehrencamp, Principles of Animal Communication, Sinauer Assoc., Sunderland, Mass., USA.

SEMESTER – II

CORE COURSE-6

(CC-6)–ZOO 203 (A): DEVELOPMENTAL BIOLOGY

General Course objectives:

While studying the **Developmental Biology** course, the student shall be able to:

1. The major objective of this course is to provide students with a sound coverage of human reproductive biology within the framework of Human Biology.
2. It also envisages the detailed structure and function of the male and female reproductive tracts, gametogenesis, fertilization, early embryogenesis,
3. Provide the knowledge about foetal development, preparation for birth, and maternal adaptations to pregnancy.

Unit – I

1.1 Introduction to developmental biology. Gametogenesis, Spermatogenesis, structure of sperm.

1.2 Oogenesis – origin and growth of oocyte, maturation of egg, egg envelops, vitellogenesis Types of eggs – Fate maps.

1.3 Events of fertilization – Formation and structure of Acrosome; Acrosomal reaction (pre fertilization events).

1.4 Fertilization in mammals (male and female gamets) – Biochemistry of fertilization and post fertilization events (cortical granual reaction).

UNIT – II

2.1 Cleavage– Patterns of cleavage – radial, spiral and bilateral; Types – meroblastic, holoblasticand superficial – factors affecting cleavage. The unique nature of mammalian cleavage.

2.2 Cellular differentiation – cyto differentiation and chemo differentiation. Stem cells – totipotency and pleuripotency. Embryonic stem cells and their applications.

2.3 Blastulation: Marula, Blastula–Mammalian gastrulation, Formation of extra embryonic membranes and sacs.

2.4 Placenta: Types of placenta and formation of placenta.

Unit – III

3.1 Nucleus cytoplasmic interaction in embryonic development.

3.2 Formation of Axis: Axis formation in mammals, Morphogenetic movements and gastrulation.

3.3 Organogenesis – Ectodermal derivatives: formation of central nervous system –development of brain, eye in frog. Mesodermal derivatives: heart and kidney in frog.

3.4 Regeneration: Types of regeneration – amphibian limb regeneration – stimulus and

suppression of regeneration. Hormonal regulation of metamorphosis: in Amphibian and Insects

Unit- IV

4.1 Environmental regulation of normal development. Chromosomal sex determination in mammals: Primary and secondary sex determination, Temperature- dependent sex determination in reptiles, Induction and competence.

4.2 Precaution and health care during pregnancy and gestation. Impotency: Causes of Impotency and sterility male and infertility in female.

4.3 Concept of test tube baby –Artificial Insemination in humans – In Vitro Fertilization (IVF) and Gamete – Intra –Fallopian Transfer (GIFT).

4.4 Theories of ageing Influence of telomere on ageing.

Course Outcomes:

On successful completion of this course, students will be able to

1. Comprehension of gametogenesis,oogenesis and fertilization process.
2. Understand the patterns of cleavage ,cellular differentiation and formation of placenta.
3. Illustrate the organization and function of organogenesis.
4. Gain the knowledge of Chromosomal sex determination,Concept of test tube baby and theories of Ageing
5. To understands Pregnancy: conception and blastocyst formation, implantation and delayed implantation, placenta: formation, types and functions, hormones in pregnancy.
6. Explain and contrast the processes of spermatogenesis, oogenesis.
7. Demonstrate an understanding of the hormonal control of reproduction in males and how this is regulated.
8. Distinguish between the main stages of embryonic, foetal and neonatal development.

SUGGESTED READING MATERIAL

1. Austen, C. R. and Short, R. V. Reproduction in Animals.
2. Schatten and Schatten. Molecular Biology of Fertilization.
3. F.T. Longo, Fertilization, Chapman & Hall.
4. R. G. Edwards, Human Reproduction.
5. S.F. Gillbert, Developmental Biology, Sinauer Associates Inc., Massachusetts.
6. Molecular Developmental Biology – 2008, T. Subramonian, Narosa Publishing House.

SEMESTER – II

CORE COURSE- 6

(CC-6)–ZOO 203 (B): ANIMAL BIOTECHNOLOGY

General Course objectives:

While studying the **Animal Biotechnology**, the student shall be able to:

1. To introduce a detailed achievements of Biotechnology, Genetic Engineering and r-DNA technology principles.
2. To gain knowledge on cloning vectors and their uses in gene cloning technologies.
3. Principles of cloning strategies and screening analysis of Re-combinations.
4. To apply principles of Biotechnology concepts in veterinary sciences i.e. production of transgenic animals, Artificial insemination, Invitro fertilization, Embryo transfer technology.
5. Application of Biotechnological principles in Medicine and Gene transfer techniques.
6. To understand the uses of Fresh and marine pearl culture technology, IPR, Patents and Copyrights.

Unit – I

1.1 General Introduction and Achievements of Biotechnology Enzymes used in gene cloning Restriction endonucleases, DNA ligases, Kinase, Phosphatase, Nucleases, Polymerases, Reverse transciptase.

1.2 Cloning vectors (Plasmids, Phages, cosmids, yeasts Shuttle vectors), viral vectors (SV40, Adenovirus and Baculovirus) used in Gene cloning.

1.3 Cloning and selection strategies of recombinants (antibiotic selection, blue white screening, colony hybridization.

1.4 Fluorescence in-Situ Hybridization (FISH) and immunological test.

Unit – II

2.1 Preparation of cell lines, types of cell lines. Types of Stem Cells, Stem Cell Therapy.

2.2 Applications of cell culture in Veterinary– Disease diagnosis, virus vaccines,hormones

2.3 Application of Biotechnology in Medicine- Production of monoclonal antibodies (Hybridoma technology), Production of vaccines and Production of Growth Hormone.

2.4 Gene therapy: Introduction, principle of gene transfer and examples (Adenosine deaminase deficiency disease, Duchenne Muscular dystrophy disease and Cystic fibrosis

Unit- III

3.1 Livestock improvement: Manipulation of reproduction in animals (Artificial insemination, multiple ovulations, *in vitro* fertilization, Embryo transfer technology).

3.2 Methods of gene transfer – Microinjection, electroporation, lipofection and viral mediated gene transfer techniques**.**

3.3 Generation of chimeric, transgenic and knockout mice and other animals and their characterization.

3.4 Gene editing- Gene silencing-CRISPR-associated protein-9 nuclease (Cas9) technology
Potential application of transgenic animals: models for various diseases/disorders, production of peptides and proteins of biopharmaceutical interest (molecular farming).

Unit – IV

4.1 Growth hormone transgenics and stem cell technology for betterment of aquaculture. Sex reversal in fishes and their applications, Production of monosex populations. Aquaculture and fish seed production: Hypophysiation, hCG injections

4.2 Marine bio/fish resources and its applications in pharmaceutical and Nutraceutical Industries

4.3 Fresh water and marine (oyster) pearl culture technology, pearl culture in India, uses of pearl culture.

4.4 Intellectual Property Rights: Introduction; Types of IP; Patents and its types, Trademark Copyright & Related Rights, Protection of GMOs; ethical and legalissues in biotechnology.

Course Outcomes:

1. Imparts the knowledge to cells lines and stem cells in culture media.
2. It gives insight into various cell/ tissues culture techniques and their applications
3. Understanding of in vitro culturing of organisms and production of transgenic animals.
4. Understanding of cloning of mammals, large scale culture and production from recombinant microorganisms and cloning vectors.
5. This insight allows students to take into consideration about ethical issues involved in production of transgenic animals and BT products.
6. Use in gene transfer technology, genetic manipulations and in a variety of Industrial
7. processes and prominence of IVF, Artificial insemination and embryo transfer techniques.
8. Gives knowledge to culture of animal cells and its culture medium.
9. Learn basic concepts and principles of recombinant DNA technology, Gene manipulation for transgenic animal production and therapeutics/ vaccine production.
10. Provides knowledge on Livestock, improvement aquaculture and pearl culture
    Provides knowledge on Intellectual property rights and genetically modified organisms

SUGGESTED READING MATERIAL:

1. A text book of Biotechnology-RC. Dubey.S.Chand & Company Ltd., New Delhi -1996.
2. A text book on Biotechnology-(n Ed.) H.D. Kumar. EWP - Private Ltd., New Delhi -1998.
3. Animal Biotechnology-M.M. Ranga, Agrobios (India), 2000.
4. Biotechnology-Fundamentals & Applications-S.S .Purohit & S.K. Mathur, Agro Botonics- 1999.
5. Biotechnology-V. Kumaresan. Saras Publication-1994.

SEMESTER – II

SKILL ORIENTED COURSE-3

(SOC-3)-ZOO 205 (A): MOLECULAR BIOLOGY

General Course Objectives:

While studying the **Molecular Biology**, the student shall be able to:

1. To understand the molecular nature of Genome and DNA damage and repair
2. To get knowledge about the DNA replication.
3. To understand the mechanism of Transcription, Translationand post translational modifications.
4. To make students understand how molecular machines are constructed and regulated so that they can accurately copy, repair, and interpret genomic information in prokaryotes and eukaryotic cells.
5. Further, to appreciate the subject of molecular biology as a dynamic and ever-changing experimental science.

Unit- I

1.1 Properties of DNA (C – Value paradox, Cot Value).

1.2 Nuclear and mitochondrial genome.

1.3 Structure of Gene (Cistron, Muton, Recon, Cis- Trans test).

1.4 DNA damage and repair: Biological induction of repair, Photo reactivation, Excision repair, Recombination repair, SOS repair, and Mismatch repair.

UNIT – II

2.1 Replication in Prokaryotes: *Geometry* of DNA replication, semi conservative replication.

2.2 Enzymology of DNA replication: DNA polymerase I, II and III; Replication of Eukaryotic chromosomes; Eukaryotic DNA polymerases; Multiple forks; Replication of Chromatin.

2.3 Discontinuous Replication: Fragments in replication fork and detection of fragments; Events in the replication fork; De novo initiation and covalent extension.

2.4 Bidirectional replication, Termination of replication.

Unit – III

3.1 Transcription, Enzymes and molecular mechanisms involved in transcription

3.2 Processing of rRNA, tRNA and mRNA in Prokaryotes and Eukaryotes

3.3 Translation: Genetic code, Polypeptide chain initiation, elongation and termination

3.4 Post-translational modifications, Role of antibiotics in protein synthesis.

Unit – IV

4.1 Genetic regulation: Induction, Repression, Lac Operon, Lambda Operon

4.2 Tryptophan operon, Britten and Davidson model for eukaryotic regulation

404.3 DNA sequencing, DNA finger printing, Polymerase chain reaction

4.4 cDNA library, Genomic library, Micro arrays.

Course Outcomes:

On successful completion of this course, students will be able to

1. Demonstrate knowledge of Molecular nature of Genome.
2. Understand the Replication in Prokaryotes and Eukaryotes.
3. Demonstrate the organization and function of Trancription and Translation.
4. Gain the knowledge of Gene expression and Molecular Biology Techniques.

SUGGESTED READING MATERIAL

1. Molecular Biology by David Freifelder, 1993
2. Molecular Biology of Gene by D.Watson, 1988
3. Harper's review of Biochemistry by D.W. Martin et al., 1990
4. Biochemistry by A.L. Lehniger
5. Cell and Molecular Biology- E.D.P. De Robertis and E.M .F.
6. Concepts in Molecular Biology- S.C. Rastogi, V.N. Sharma and Ananda Tandon (1993)
7. Genes - VII by Benjamin Lewin.

SEMESTER – II

SKILL ORIENTED COURSE-3

(SOC-3)-ZOO 205 (B): MEDICAL BIOTECHNOLOGY, IPR, BIO-SAFETY AND BIO-ETHICS

General Course Objectives:

While studying the **Medical Biotechnology, IPR, Bio-Safety and Bio-Ethics**, the student shall be able to:

1. Study the types of Gene therapy and its uses in Medical Biotechnology.
2. This course is designed to develop the knowledge on PCR, Immunological assays, cloning and animal cell culture techniques.
3. To study the fertilization, organogenesis, potency and differentiation, Morphogenesis in the developmental biology.
4. To gain knowledge on bacterial, plant and animal viruses.
5. This course helps to adhere to the ethical practices appropriate to the discipline at all times.
6. Adapt to the safe working practices, relevant to the bioindustries and research field.

Unit – I

1.1 Disease diagnosis-probe: PCR, LCR immunological assay. Detection of genetic, Neurogenetic disorders involving Metabolic and Movement disorders.

411.2 Treatment products from recombinant and non- recombinant organisms Interferons, Antisense therapy, cell penetrating peptides, Gene therapy.

1.3 Types of gene therapy, somatic virus germline gene therapy, mechanism of gene therapy, Immunotherapy.

1.4 Detection of mutations in neoplastic diseases MCC, SSCP, DGGE, PTTC.

Unit – II

2.1 Animal Biotechnology: Development Biology; fertilization and organogenesis

2.2 Stem cells; potency and differentiation, different signaling for development, Morphogenesis in different model systems.

2.3 Cloning; Transgenic and knockout systems.

2.4 Animal cell Culture methods.

Unit – III

3.1 Virology: Classification and modes of propagation; bacterial, plant and animal viruses morphology and ultrastructure; assay of viral particles, cell culture; viral enzymes, nucleic acids.

3.2 DNA viruses: Herpes, Hepatitis B, Adeno virus; RNA viruses: Polio, VSV, Influenza,

3.3 Retroviruses: Structure, life cycle, transformation; TMV, Baculoviruses,; Response to viral infections: slow and persistent infections, Antiviral agents, Interferons.

3.4 Economics, Biosafety. Patent rights and Special Topics Biotechnology R & D and industry: Business aspects of biotechnology, research and market place, Finance and human resources: Intellectual property right: patents, R & D partnership, license agreement and joint venture.

Unit – IV

4.1 Innovation Management: Technology transfer tools, Industry-Academia collaborations, Bioincubators, Bio-accelerators, Finishing school;

4.2 Bioethics: Role of bioethics in research. Prevention and management of plagiarism, fabrication/manipulation of data, conflict of interest, socio-cultural and behavioral conflicts during the conduct of research.

4.3 Authorship & patenting/commercial rights and conflicts. Bioethical norms governing research related to animals and humans.

4.4 Biosafety: Prevention and management of chemical and biological hazards associated with research. Evaluation and interpretation of data sheets, labels etc. for pre-assessment of biological and chemical hazard.

Course Outcomes:

1. Student comes familiar with the Application of Biotechnological techniques in control of neurogenetic diseases and neoplastic diseases.
2. Students will gain awareness about Intellectual Property Rights (IPR) to take measures for protecting their ideas.
3. Gains knowledge on the Developmental stages of organism in Animal Biotechnology.
4. They will be able to devise business strategies by taking account of IPRs.
5. Students will develop awareness about bioethics and biosafety, Authorship and patenting / commercial rights and conflicts.
6. Students will develop the knowledge on bacterial, plant and animal viruses.

SUGGESTED READING MATERIAL:

1. Sasson A, Biotechnologies and Development, UNESCO Publications, 1988.
2. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, Mc Graw-Hill, Newyork, 1996.
3. Sasson A. Biotechnologies in developing Countries present and future, UNESCO Publishers, 1993.
4. Biosafety: Principles and Practices (Biological safety: Principles and Practices) by Diane O., Ph.D. Fleming and Dbra Long Hunt (Aug 30, 2006).
5. S.F. Gillbert, Developmental Biology, Sinauer Associates Inc., Massachusetts
6. Schatten and Schatten. Molecular Biology of Fertilization.
7. Bioethics and Biosafety in Biotechnology, Sree Krishna.V. (2007), New Age International Publishers.

SEMESTER – II

SKILL ORIENTED COURSE-4

(SOC-4)-ZOO 206 (A): ENVIRONMENTAL BIOLOGY

General Course Objectives:

While studying the **Environmental Biology**, the student shall be able to:

1. The objectives of the course are to develop the ability to solve the problems related to the environment, to make them aware of various eco-friendly techniques and modern techniques to solve various environment-related problems.
2. The objective of this course is to make awareness among the young students about the surrounding environment, the impact of climate change and its mitigation and biodiversity.
3. The aim of the contents of this course is to introduce and explain about various conservation issues of the ecosystem and animals.
4. Man himself is a part of ecosystem. The ecosystems in the world are continuously under the pressure of anthropogenic activities and human mediated ecological changes. Several animal species are under the survival threats. To introduce the students about wildlife and wild habitats, about depleting wild life and human wildlife conflict.
5. Generate an interest in Ethology in order to understand the complexities of both animal and human behavior.
6. To understand the basic theories and Principles of Ecology.
7. To learn about current environmental issues based on Ecological principles.
8. To study Environmental pollution and their management.

Unit – I

1.1 Environment: Definition, Types of environment. General account of biomes and Types of Ecosystem.

1.2 Fresh Water Ecosystem - Classification and characteristics and stratification of the ecosystem.

1.3 Marine Water Ecosystem - Classification and characteristics and stratification of the ecosystem.

1.4 Terrestrial Ecosystem; Forest Ecosystem- Classification and characteristics and stratification of the ecosystem.

Unit – II

2.1 Energetics of Ecosystem: Tropic dynamic view of ecosystem.

2.2 Energy flow – Primary productivity and Secondary productivity. Factors influencing productivity.

2.3 Energy Budget: Estimation of Energy Budget and Methods of measuring productivity for

different Ecosystems – harvesting method, CO2 assimilation method, oxygen production method, chlorophyll method.

2.4 Bioaccumulation and Biomagnification.

Unit - III

3.1 Air Pollution: Health hazards and Toxicology – Related episodes in India and Abroad.

3.2 Water Pollution: Health hazards and toxicology – Related episodes in India and Abroad.

3.3 Epidemiology: Role of Environmental epidemiological studies and Health indices in evaluation of environmental health hazards: Environmental epidemiological episodes in India and Abroad.

3.4 Environmental Laws in India – legislation and Execution**.**

Unit – IV

4.1 Bio indicators and environmental monitoring.

4.2 Environmental Impact Assessment (EIA): Methods for EIA assessment, Socio-economic effects and impacts.

4.3 Bioremediation: Need and Scope of bioremediation. Environmental applications of bioremediation.

4.4 Phytoremediation: Biotechnological cleaning up of the environment by plants.

Course Outcomes:

1. The student will get idea about the ecological process in its surrounding and at National and Global level and the use of student knowledge on Ecology, Behaviour can be applied to Education, Research and Extension programmes in his further career.
2. Students will understand the various features and aspects of population ecology, community ecology and ecosystem ecology. They might have the knowledge about environmental biology in details. They will acquire knowledge about various tools and techniques of field ecology.
3. Students will be able to apply the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
4. Students will be able to use interdisciplinary approaches such as ecology, economics, ethics and policy to devise solutions to environmental problems.
5. Students will be able to be proficient in ecological field methods such as wildlife survey, biodiversity assessment, mathematical modeling and monitoring of ecological systems.
6. Students will be able to use technology, such as geographical information systems and computer programming, to assist in problem solving.
7. This paper will help in creating skilled personnel in the field of environment protection and research.
8. Demonstrated an understanding of Ecological relationships between organisms and their environment.

SUGGETED READING MATERIAL

1. Practical methods in Ecology & Environmental Science, R K. Trivedy, Goel, Trisal, 1997.
2. Environmental Physiology of desert organism. Ed. by N.F. Hadley-Dowden Huchinson and Ross, Inc. Penn. USA.
3. The Ecology of wastewater treatment - H. A. Hawkes pergoman press, 1963.
4. Biochemical ecology and water pollution - PRDugan, plenum press, London, 1972.
5. Pesticides in the environment – R. White Stevenns, Marcel Dekker Inc. New York, 1971.
6. Environmental Science Research Volu mes: Vol.1. Indicators of environmental quality - WA. Thomas, 1972. Vol. 3. Environmental pollution by pesticides - C. A. Edwards, 1974.
7. Vol. 5. Environmental dynamics of pesticides - R. Hague and V. H. Preed, 1975.
8. Ecology & Environment - P. D. Sharma, 1991.
9. Field Biology & Ecology - Allen H Benton & E. Werner, J R, 1980.
10. Encyclopedia of environmental pollution and control, enviromedia, Karad , Vol. 1 & 2, R. K Trivedi.
11. Health hazards and human environment, World Health Organization (WHO) 1972.
12. Current pollution research in India - R K. Trivedy and P.K. Goel. Karad. Environmental Biology and Toxicology -P. D. Sharma, Rastogi Publications, Meerut (India), 1998.
13. Biodegradation & Bioremediation - 2 nd editon, Martein Alexander - AcademicPress, 1999, USA.

SEMESTER – II

SKILL ORIENTED COURSE-4

(SOC-4)-ZOO 206 (B): ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND GREEN AUDITING

General Course Objectives:

While studying the **EIA and Green Auditing** course, the student shall be able to:

1. To impart knowledge on different concepts of Environmental Impact Assessment.
2. Develop skills in identifying and solving environmental problems.
3. To teach procedures of risk assessment.
4. To teach the EIA methodologies and criterion for selection of EIA methods.
5. To teach procedures for environmental clearances and audit.

Unit – I

1.1 Basic Concept of Environmental Impact Assessment: Elements of EIA, Factors affecting EIA.

1.2 Impact evaluation and analysis, preparation of Environmental Base map. Classification of environmental parameters.

1.3 EIA Methodologies: introduction, Criteria for the selection of EIA Methodology,

1.4 EIA methods: Ad-hoc methods, matrix methods, Network method Environmental Media QualityIndex method, overlay methods, cost/benefit Analysis

Unit – II

2.1 Introduction and Methodology for the assessment of soil and ground water, Delineation of area, Identification of activities.

2.2 Procurement of relevant soil quality, Impact prediction.

2.3 Assessment of Impact significance, Identification and incorporation of mitigation measures.

2.4 EIA in surface water, Air and Biological Environment: Methodologies for the assessment of impacts on surface water environment, air pollution sources, Generalized approach for assessment of air pollution Impact.

Unit – III

3.1 Assessment of Impact of development Activities on Vegetation and wildlife.

3.2 Environmental Impact of Deforestation – Causes and effects of deforestation.

3.3 Procurement of relevant soil quality, Impact prediction.

3.4 Assessment of Impact significance, Identification and Incorporation of mitigation measures.

Unit – IV

4.1 Environmental Audit & Environmental legislation: objectives of Environmental Audit. Types of environmental Audit, Audit protocol.

4.2 Stages of Environmental Audit, onsite activities. Evaluation of Audit data and

preparation of Audit report, Post Audit activities.

4.3 The Environmental Protection Act: The Water Act, The Air (Prevention and Pollution Act), Motor Act, Wildlife Act, Case Studies and Preparations of Environmental Impact Assessment statement for various Industries.

4.4 Various Certifying Agencies in Operation. Carbon Sequestration: Sources and Sinks, Biological Processes, Physical Processes, Chemical Processes.

Course Outcomes:

1. Explain the concepts about Environmental Impact Assessment, develop skills in identifying and solving problems
2. Locate, analyze and evaluate information's from various environmental matrices systematically.
3. Be able to access and analyze different case studies/examples of EIA in practice for evaluation/assessment.
4. Explain the importance of environmental audits and other management tools in business for social benefit by improving environmental performance.
5. Calculate the carbon footprint of any organization and identify suitable mitigation strategies for carbon reduction solutions.

SUGGESTED READING MATERIAL:

1. Environmental Impact Statements, Bregman, J. I. (1999), Lewis Publishers, London
2. Environmental Assessment, Singleton R, Castle, P and Sort, D. (1999), Thomas Telford Publishing, London.
3. Effective Environmental Assessment, Eccleston, C. H. (2000), Lewis Publishers, London.
4. Environmental Auditing, Humphery, N. and Hadley. M. (2000), Boca Raton, USA.
5. Green Accounting, Bartelmus, P. and Seifert, E. K. (2017), Taylor & Francis Limited.
6. Perspectives in Environmental Studies, Kaushik, A. and Kaushik C. P. (2014). 4th Edition, New Age International Publishers, New Delhi.
7. Carbon Sequestration for Climate Change Mitigation and Adaptation, Ussiri, D. A. N. Lal, R. (2017), Springer International Publishing.

SEMESTER – II

OPEN ONLINE TRANSDISCIPLINARY COURSE – 1

(OOTC-2) ZOO 208

*Open Online Transdisciplinary Course (OOTC-2) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,

SEMESTER – II

AUDIT COURSE – 2

(AC-2)-ZOO 209: INDIAN KNOWLEDGE SYSTEM-1

Audit Course (AC-2) – Zero Credits

ZOO--209 - Indian Knowledge Systems – 2

Learning Objectives:

1. To facilitate the students with the concepts of Indian traditional knowledge and to make themunderstand the importance of roots of Indian Knowledge System.
2. To help student to understand the knowledge, art and creative practices, skills and values inancient Indian system.
3. To make students acquaint with the facets of traditional knowledge& their relevance and helpthem be able to apply it to their day to day life.

Learning Out comes:

1. At the end of the course, students will be able to gain insights into the concept of traditionalknowledge and its relevance.
2. They will also be able to understand and connect up the basics of Indian traditional knowledgewith modern perspective.
3. Apply traditional knowledge for sustainability

SYLLABUS

Unit I : Diversity and Indian Culture: Diversity and Indian Culture; Indigenous Faith and Religion; Preservation of culture and indigenous knowledge .

Unit II : Indian Calendar: Panchanga. Adhikamasas. Solar and Luni-Solar systems.Solar and Lunar Eclipses Angular diameters of the Sun, Moon and Earth's shadow. Possibility of eclipses. Finding the middle of an eclipse by iteration. Amount of obscuration at any time.

Unit III : Indian Architecture and Town Planning: Introduction ancient Indian architecture; Sthapatya-Veda: An Introduction; Indigenous tools & techniques for town planning & Temple Architecture. Lothal, Mohan Jo Daro; Temple Art: Lepakshi Temple, Jagannath Puri Temple, Konark Sun Temple.

Unit IV : Indian Agriculture: Significance in Human Civilization; Sustainable Agriculture; Historical significance of agriculture and sustainable farming in India; Step Cultivation of India: Special reference to Northeast India; Wet rice cultivation of Assam.

Reference Books:

1. Baladev Upadhyaya, Samskrta Śāstrom ka Itihās, Chowkhambha, Varanasi, 2010.
2. D. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., A Concise History of Science in India,2nd Ed., Universities Press, Hyderabad, 2010.
3. Astāngahrdaya, Vol. I, Sūtrasthāna and Śarīrasthāna, Translated by K. R. Srikantha Murthy,Vol. I, Krishnadas Academy, Varanasi, 1991.
4. Dharampal, The Beautiful Tree: Indian Indigenous Education in the Eighteenth Century,Dharampal Classics Series, Rashtrotthana Sahitya, Bengaluru, 2021.
5. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavan RN. (2022), Introduction to IndianKnowledge System: Concepts and Applications. PHI Learning Private Ltd.
6. Mukul Chandra Bora, Foundations of Bharatiya Knowledge System. Khanna Book PublishingD. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., A Concise History of Science in India,2nd Ed., Universities Press, Hyderabad, 2010.
7. Textbook on The Knowledge System of Bhārata by Bhag Chand Chauhan,
   M. S. Sriram, Man and the Universe- An elementary account of Indian Astronomy, (Unpublished 1993).

M.Sc., ZOOLOGY SEMESTER – III

CORE COURSE-7

(CC-7) ZOO 301: APPLIED TOXICOLOGY

General Course Objectives:

While studying the **Applied Toxicology**, the student shall be able to:

1. This paper is aimed to create awareness of Toxicant, heavy metal toxicity and environmental pollution and ecological impact assessment
1. To emphasize on principles of toxicology- toxins, dose, doe effect and dose response relationships, factors of toxicity, metabolism of toxicants
2. To describe about Biochemical Toxicology- mechanism and reactions of toxicants, Lipid peroxidation, Oxidative stress
3. To make the student understand about the knowledge of systemic toxicology, Environmental and Occupational Toxicology

Unit - I

1.1 Definition, scope and importance of toxicology; classification of toxic agents -natural toxins, animal toxins, plant toxins, food toxins, genetic poisons and chemical toxins.

1.2 Dose, dose effect and dose response relationship – Acute toxicity, chronic toxicity; toxic kinetics.

1.3 Factors affecting toxicity - species and strains, age, sex, nutritional status, hormone, environmental factors.

1.4 Absorption and distribution of toxicants, portals of entry- Skin, gastrointestinal tract and respiratory system. Bio-accumulation, bio-magnification, bio-transformation and elimination of xenobiotics.

Unit – II

2.1 Mechanism and reactions of toxicants - Covalent bonding, non-covalent bonding and enzymatic reactions.

2.2 Lipid peroxidation – Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS); Mechanism of Reactive Oxygen Species production; Superoxide, hydrogen peroxide and hydroxyl radicals in toxicity of xenobiotics.

2.3 Oxidative Stress - Antioxidant defense mechanism – Role of glutathione, superoxide dismutase, metallothionine.

2.4 Xenobiotic induced intracellular and cellular alterations

Unit – III

3.1 Basics of organ toxicity - Target organs, organ selectivity and specificity.

3.2 Hepatotoxicity - susceptibility of the liver; Types of liver injury and biochemical mechanism.

3.3 Pulmonary toxicity –systematic lung toxins, lung pathology, renal toxicity –Chemical induced renal injury.

3.4 Neuro toxicity – Effect of toxic agents on neurons, ion channel neurotoxins; Lesions of neural tissue.

Unit – IV

4.1 Eco-toxicology of heavy metals –Mechanism of heavy metal toxicity; Case studies of Arsenic, Mercury and Cadmium.

4.2 Toxicity of organochlorine and organophosphate pesticides; case studies of DDT, endosulphan, parathion and malathion.

4.3 Occupational hazards - physical, chemical, biological and mechanical hazards. Occupational diseases: Pneumoconiosis, silicosis, asbestosis; Prevention of occupational diseases.

4.4 Legislation and Regulation – Federal government, State government; Legislation and regulation in other countries.

Course Outcomes:

On successful completion of this course students will be able to

1. Gain knowledge on dose relationship, factors affecting the toxicity and absorption and biotransformation of Xenobiotics.
2. Understanding the bonding between toxicant and biological molecules and oxidative stress.
3. Demonstrate the Knowledge of Basic organ toxicity.
4. Understand the concepts of Ecotoxicology, occupational toxicology and Legislation rules.

SUGGESTED READING MATERIAL

1. Toxic interactions – R .S .Goldstein, W .R. Hewi tt and J. B .Hook. Academic press–1990.
2. Pesticides and Human Welfare – D. L. Gunn and J. G. R. Stevens. Oxford Universit y Press – 1978.
3. Pesticides act i on and Metabolism – O' B r i e n.
4. Environmental toxicology of Pesticides – F. M astimura , G . M. Boushand T . Misato.
5. Theen cyclopedia of Americ ana – VO l. 1 5.
6. Introduct on to Biochemi cal Toxicology y – E . Hodgson & F. E. Guthrie.
7. Casaet t & Doul 's – Toxicology – The basic science of poisons – C . D. Klassen, Mary, O. D. & Joh n Do u l l.
8. Concepts of Toxicology D r. Omkar, Vishal Publishing C. 2003.

SEMESTER – III

CORE COURSE-8

(CC-8)-ZOO 302(A): ENZYMOLOGY AND METABOLISM

General Course Objectives:

While studying the Enzymology and Metabolism course, the student shall be able to:

1. To understand the classification & nomenclature of enzymes and the factors effecting enzymatic reaction.
2. Learn about the mechanism of Enzyme action.
3. Familiar about the chemical nature of enzymes and their function in biochemical reactions.
4. Study the effects of the inborn errors of metabolism.
5. Understand the synthesis & degradation process of carbohydrates, lipids, amino acids & nucleic acids

Unit – I

1.1 Classification of enzymes and nomenclature.

1.2 Enzyme specificity (optical specificity, group specificity). Isolation of enzymes,

1.3 Kinetic properties of Enzymes- kinetic theory and collision theory. Rate constant, First order, Second order and Zero order reactions).

1.4 Effect of enzyme concentration, pH and temperature and substrate concentrationon Enzyme activity - Determination of kinetic constants (Km and Vmax).

Unit - II

2.1 Inhibition of enzyme activity (competitive, non-competitive, uncompetitive and mixed inhibition). Allosteric Inhibition.

2.2 Regulation of enzyme activity –Activation of Zymogen-Control of Enzyme synthesis-Enzyme Degradation-Enzyme Inhibitors.

2.3 Mechanism of enzyme action (Lock and key; Induced fit model), catalytic site.

2.4 Application of enzymes- Enzymes in clinical diagnosis. -Immobilized enzymes and their applications. Isozymes- Steps in enzyme engineering.

Unit – III

3.1Glycolysis, TCA cycle and their biomedical importance.

3.2Pentose phosphate pathway, Gluconeogenesis, Regulation of carbohydrate metabolism.

3.3Beta-oxidation of palmitic acid; Biosynthesis of long chain fatty acids.

3.4Oxidative deaminaiton, decarboxylation and transamination of amino acids. Biosynthesis of Urea, Biosynthesis of polyamines.

Unit – IV

4.1Biosynthesis of Nucleotides- biosynthesis of purines, biosynthesis of pyrimidines, importance of nucleotides.

4.2Degradation of Nucleotides- Degradation of purines and pyrimidines,

4.3Clinical disorders of purine metabolism – Lesch-Nyhan disease adenylosuccinatelyase deficiency, Myoadenylatedeaminase deficiency, Adenosine deaminase deficiency, deoxyguonosine deficiency.

4.4Types and function of Porphyrins.

Course Outcomes:

On successful completion of this course students will be able to

1. Understand the classification and Kinetic properties of enzymes.
2. Gain the Knowledge about the Regulation of Enzyme activity.
3. Demonstrate the Knowledge of different concepts of Intermediary metabolism.
4. Understand the concepts of Biosynthesis and degradation of nucleotides of Purina Metabolism, Prophysins.

SUGGESTED READING MATERIAL

1. Robert K.Murrey, D.K.Granner, P.A.Mayes and V.W.Rodwell; Harper's Biochemistry, Lange Medical.
2. D. Voet and J.G Voet, Biochemistry,1.Wiley & Sons.
3. David L. Nelson and Michael M. Cox, Lehninger; Principles of Biochemistry, McMillan worth Publishers.
4. Enzyme kinetics by D.V Roberties, Cambridge University Press.
5. Enzyme Kinetics by1.W.Segil.
6. BiochemicalcalculationsbyI.H. Segel2ndEd.JohnWiley&Sons.
7. Biochemistry byD.Voetand J.G. Voet,J.Wiley&Sons

SEMESTER – III

CORE COURSE-8

(CC-8)–ZOO 302 (B): BIOSTATISTICS AND BIOINFORMATICS

General Course Objectives:

While studying the Biostatistics and Bioinformatics course, the student shall be able to:

Biostatistics objectives:

1. This course will be helpful in the learning and understanding the applications of various biostatistical methods and tools in research.
2. Students studying this course will be able to perform the data analysis using Statistical tools available on any computer such as Excel as well as the programmes for big and complex data.
3. Students gain knowledge on scope and importance of biostatistics.
4. Students learn and practice various statistical methods used in Zoological studies and research.

Bioinformatics Objectives:

1. The main objective of the course is learning and understanding the detailed developments and applications of the field of Bioinformatics in varied area of biological research.
2. This course generally focuses on Genomics, Proteomics and Computational biology studies and their relevance on research platform. To learn the fundamentals of Computational Biology.
3. The course is designed in such a way that the students get the confidence to use computer programs for the daily design of experiments, data collection and analysis of results.
4. It involves the integration of Computers, Software tools and Databases in an effort to address biological questions. It involves different tools to unwrap different biological functions arise during study area of biological research.
5. To study different methods of data processing, the different outline databases of biological information and the different DNA and Protein analysis software.
6. To develop skills of data handling using computer and to learn about different data representation methods.

Unit – I

1.1 Definition of statistics: Biostatistics, classification, variables and attributes, Diagramatic distribution of biological data.

1.2 Measures of location and dispersion: Arithmetic mean, median and mode. Mean deviation, quartile deviation, Standard deviation and co-efficient of variation.

1.3 Curve fitting: Fitting strait line, parabola exponential curve and geometric curve to the data,

fitting of straight line using Ms-Excel.

1.4 Correlation and regression: Scatter diagram, types of relationship. Positive and negative correlation, computation of correlation coefficient, Interpretation of correlation coefficient. Simple regression lines and its interpretation.

Unit – II

2.1 Normal probability distribution & its applications.

2.2 Tests of significance: level of significance, null and alternative hypothesis, power of test and pvalue of a test.

2.3 Student t- test for one a sample and two samples means-paired t-tests.

2.4 F-test, chi square test and their application, concept of ANOVA.

Unit - III

3.1 Scope, importance and status of Bioinformatics.

3.2 Internet basics, Tools for web search, Data retrieval tools.

3.3 Sources of websites. WWW,HTML etc

3.4 Data base types-primary, secondary and specific annotation databases.

Unit – IV

4.1 Database types, Prediction of protein structure and protein folding, Protein sequence databases.

4.2 Prediction of gene structure, Functional genomics, Genomic databases.

4.3 Submission of sequence to the database, Homology, BLAST- Types of BLAST.

4.4 Phylogenetic analysis, Human genome project.

Biostatistics Course Outcomes:

1. Came to know the data collection, tabulation and presentation.
2. Described the mean, median, mode and SD.
3. Understood the Analysis of Variance.
4. Described student‘t’ test and probability.
5. Understood the Correlation and Regression.
6. The student will learn the basics of handling of data, measures of Central tendency like Mean,Median and Mode, Measures of dispersion like Mean deviation and Standard deviation and Coefficient of Variation.
7. The course will aid in learning Test of significance like Null hypothesis and Alternative hypothesis, t-test, F-test, Chi-square test, Correlation and Regression analysis.

Bioinformatics Course Outcomes:

1. It provides information to the students about database and Computer science into the area of Biology for the purpose of studying and processing genomic information as well as other

forms of biological information.

2. Familiar with various Applications of Bioinformatics by exploring the fundamentals of computer applications in Biology.
3. Describe different methods of data handling using computers.
4. Feed and tabulate raw data using computer.
5. Explain and perform data representation using digital methods.
6. Access and download relevant information from different online databases of biological information.
7. Perform basic operations of gene sequence retrieval and compare them using different software.
8. Perform basic operations of protein structure retrieval and comparison using different software.
9. The student will learn about the Computer basics like Operating systems, Programming, Data Access, Internet and Nucleic acid Sequence and Protein Data Banks. The course will help to understand the Database similarity searches like BLAST, FASTA etc.
10. Multiple sequencing alignments, Primer designing, Homology modeling, Phylogenetic analysis & Drug designing and Determination of Secondary and Tertiary structure of proteins.

SUGGESTED READING MATERIAL:

1. Basic Bioinformatics by S. Ignacimuthu, s. j. Narosa publications, 2005.
2. Bioinformatics by Andreas D. Baxevanis and B.P. Francis Ouellette, 2nd Ed., 2002.
3. Bioinformatics, Methods and Applications, Genomics proteomics and drug discovery, S.C. Rastogi, N. Mendiratla and P. Rastogi, prentice-Hall ofIndia, 2004.
4. Bioinformatics. Murthy, C.S.V. Himalaya Publishing House, Hyderabad.
5. Computers to-day by Suresh K.Basandra (1999), Published by Galagotia publications, Pvt.Ltd., New Delhi.
6. Database processing by D.M. Kroenke, Galgotia publications, 1990.
7. Introduction to Bioinformatics, S. Sundara Rajan and R. Balaji, Himalaya Publishing House, 2003.
8. Microsoft Office, by Setultz, 1997.
9. Bio-Statistics- An introductory text-Goldstein, A The Macmillan Co., New York, 1971.
10. Biostatistics by Lewis Alvin (1971) Affiliated East West Press pvt., Ltd., New Delhi.
11. Bio-Statistics- By Lewis Alvin E. Affiliated East-West press (P) Ltd., 1971.
12. Interpretation and uses of Medical Statistics – G.J. Bourke &J.Mc.Gilvaray, BlovkwellScience Publication,London, 1969.
13. Introduction to Biostatistics – By Sokal – Rohlf (2nd Edn) Freeman International Editor (1973).

14. Introduction to Biostatistics by Holdan Bancroft (1962) PualB.Hoebar Inc., New York.
15. Introduction to Instrumental analysis, Ronert Braun. McGraw Hill Intemational edition.
16. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker,VII volume, Cambridge press Edition.

SEMESTER – III

CORE COURSE-9

(CC-9)–ZOO 303 (A): WILDLIFE CONSERVATION BIOLOGY AND FIELD TECHNIQUES

General Course objectives:

While studying the Wildlife Conservation Biology and Field Techniques course, the student shall be able to:

1. To make the students equipped with the knowledge of wildlife resources of India having emphasis to the principles and applications of various wildlife management technique
2. Wildlife management: Courses in wildlife management can help students learn about modern concepts, conservation policies, and scientific methods used to assess biodiversity and monitor conservation goals.
3. They can also help students develop skills to resolve conflicts between humans and wildlife.
4. Wildlife conservation biology: Courses in wildlife conservation biology can help students
5. learn about wildlife management and conservation planning through hands-on field research.
6. These courses can help students prepare to protect endangered species and tackle environmental challenges.
7. Wildlife conservation action: Courses in wildlife conservation action can help students learn about ecosystem and biodiversity conservation and management.
8. These courses can also help students learn how to manage and mitigate wildlife conflict and natural resources.

Unit – I

1.1 Wildlife: Basic concepts and principles of wildlife, Importance and Values of wildlife; Wildlife heritage of India, Reasons for wildlife depletion in Indian context.

1.2 Concept of threatened fauna – IUCN categories of species; Distribution of wildlife in India. List of Endemic, Scheduled animals and Species on the verge of Extinction in AP and India.

1.3 Human and animal Conflicts: Basic concepts, reasons for conflicts, Identification of damages caused by wild animals and control measures, Socio-economic issues related to human – wildlife interactions.

1.4 Animal Relationships: Mutualism; Commensalisms; Parasitism; Ammensalism; Predation and Competition with relevant examples.

Unit – II

2.1 Conservation of wildlife – Types of Conservation; Case studies – Wildlife sanctuary, National parks, Zoological parks, Biosphere reserves, Tiger reserves etc.

2.2 Government and Non-government organizations and their role; Important NGO movements – Chipko Movement, Narmada Bachavo Andolan, Seed Movement, Pani Panchayat).

2.3 Wildlife protection Acts; Wildlife management before and after implementation of Wildlife (Protection) Act, 1972.

2.4 Projects undertaken for protection of wildlife: Project Tiger, Project Lion, Project Crocodile, Project elephant etc. Translocation of wild animals: Principles, methods and application.

Unit – III

3.1 Vegetative analyses – Quadrat method, Point centered quadrat, Strip transect; Habitat manipulation: Food, Water, Shade, impact and removal of invasive alien species.

3.2 Basic survey techniques of Habitats: Map reading, Google map, satellite images (types of forests, hilly areas, Valleys, boundaries, drainages, buildings, roads etc.)

3.3 Population Estimation: Basic concepts and applications - Direct count (block count; transect methods, Point counts, visual encounter survey, waterhole survey).

3.4 Indirect count (Call count, track and signs, pellet count, pugmark, nests, camera trap, DNA finger printing and aerial photography). Techniques for photographing of animals and identification of indigenous fishes, herpetofauna and birds.

Unit - IV

4.1 Audio records: Various audio recording techniques, sonogram evaluation, Applications of audio recordings (Bird songs, insect calls, habitat usage by bats etc.)

4.2 Use and application of GPS (Global Positioning System) – Way points, tracks etc.

4.3 Use and applications of GIS (Geographic Information System) software's.

4.4 Use and applications of Remote Sensing in wildlife conservation – Satellite imageries and false color imaging.

Course outcomes:

After the completion of the course, a student will be able to achieve these outcomes:

1. Sampling and experimental skills: Demonstrating the ability to use scientific sampling and experimental techniques in conservation science
2. Data analysis: Applying statistical techniques to biological, environmental, and ecological data, and interpreting the results
3. Sampling design: Developing sampling designs to address real-world wildlife conservation issues
4. Technical writing: Demonstrating the ability to write in a technical style for wildlife conservation and management
5. Data presentation: Using graphical methods to present data in wildlife conservation
6. Wildlife identification: Learning to identify species, their characteristics, and their habitat

requirements.

7. Conservation policy: Understanding conservation policies and legislation, and how they are enforced.
8. Wildlife management: Developing skills for scientific wildlife management planning
9. Human-wildlife conflict: Developing skills for resolving conflicts between humans and wildlife.
10. Ecological assessment: Learning how to conduct a rapid ecological assessment of a site.
11. Resource use survey: Learning how to survey the use of resources

SUGGESTED READING MATERIAL:

1. Saharia, V.B. 1982 Wildlife in India, Nataraj Publishers, Dehra Dun
2. Seshadri, B.1986 India's Wildlife reserves , Sterling Pub'rsPvt. Ltd., New Delhi
3. Giles, R.H. Jr. (Ed) 1984. Wildlife Management Techniques 3rd edition. The wildlife Society, Washington. D.C. NatarajPublishers,Dehradun. India
4. Dasmann, RF. 1964, Wildlife Biology. John and Wiley and sons Newyork. Pp231.
5. Robinson, Wl. and Eric, G. Bolen, 1984. Wildlife Ecology and Management Mac Millan Publishing Co, Ny. Pp 478.
6. Menon, V. 2003. A Field Guide to Indian Mammals. Dorling Kindersley (India) Pvt. Limited
7. Thomas, A.P. (Ed) 2013. Biodiversity Scope and Challenges. Green leaf Publications, Kottayam.
8. Sharma P.D. 2001. Ecology and Environment. RastogiPulications, Meerut

SEMESTER – III

CORE COURSE- 9

(CC-9)–ZOO 303 (B): APICULTURE

General Course objectives:

While studying the Apiculture, the student shall be able to:

1. Understand the historical significance of apiculture, the evolution of beekeeping practices, and the cultural importance of bees in different societies.
2. Identify and compare the characteristics, behavior, and threats faced by Apis Mellifera (European Honey Bee) and indigenous bee species used in beekeeping.
3. Analyze the life cycle of bees, the social structure within bee colonies, and the mechanisms of communication and foraging behavior in bees.
4. Examine the external anatomy of bees, specialized structures such as the proboscis and stingers, and metabolic processes involved in energy production and temperature regulation.
5. Evaluate different types of beehives including Langstroth, Top-Bar, Warre, and Observation hives, considering their pros, cons, and suitability for various purposes.
6. Demonstrate knowledge of essential beekeeping equipment and safety gear such as smokers, hive tools, protective clothing, gloves, and boots, and understand their uses in hive inspection and manipulation.
7. Develop skills in apiary management including site selection, hive orientation, inspection schedules, and swarm prevention techniques across seasons.
8. Explore the diverse range of bee products including varietal honeys, bee pollen, royal jelly, propolis, beeswax, and other bee-derived products, understanding their composition, properties, health benefits, and various applications.

Unit - I

1.1 History and Importance of Apiculture, Evolution of Beekeeping Practices, Cultural Significance of Bees in Different Societies, Role of Bees in Pollination, Global Impact of Decline in Bee Populations.

1.2 Characteristics and Behavior of Apis Mellifera (European Honey Bee), Indigenous Bee Species Used in Different Regions, Threats and Challenges Faced by Bee Species in Apiculture.

1.3 Life Cycle of Bees: Egg, Larva, Pupa, Adult; Social Structure in Bee Colonies: Queen, Worker, Drone; Communication Among Bees.

1.4 External Anatomy of Bees: Head, Thorax, Abdomen; Specialized Structures in Bees: Proboscis, Pollen Baskets, Stingers; Metabolic Processes in Bees: Energy Production, Temperature Regulation.

Unit – II

2.1 Langstroth Hives: Pros and Cons; Top-Bar Hives: Suitability for Natural Comb Building; Warre Hives: Vertical Hive Design; Observation Hives: Educational and Research Purposes.

2.2 Smoker: Purpose and Techniques of Smoking Bees; Hive Tool: Uses for Inspecting and Manipulating Hives; Bee Suit and Veil: Importance of Protection in Beekeeping; Gloves and Boots: Safety Gear for Handling Bees.

2.3 Locating Apiaries: Factors to Consider for Beeyard Placement; Hive Orientation: Sunlight, Wind Protection; Hive Inspection Schedule: Regularity and Best Practices; Swarm Prevention and Control Methods.

2.4 Spring Colony Management: Queen Assessment, Brood Inspection; Summer Honey Flow Management: Adding Supers, Harvesting Honey; Winter Hive Management: Insulation, Ventilation, Pest Control.

Unit - III

3.1 Varietal Honeys: Acacia, Clover, Orange Blossom; Raw Honey vs. Processed Honey: Nutritional Differences; Medicinal Properties of Honey: Antibacterial and Antioxidant Effects; Culinary Uses of Different Honey Varieties.

3.2 Composition of Bee Pollen: Proteins, Vitamins, Minerals; Health Benefits of Bee Pollen: Allergy Relief, Energy Boost; Processing and Storage of Bee Pollen.

3.3 Health Benefits of Royal Jelly: Anti-Aging, Immune Boosting; Propolis: Natural Antibiotic Properties; Use of Royal Jelly and Propolis in Traditional Medicine.

3.4 Composition and Properties of Beeswax; Uses of Beeswax in Cosmetics, Candles, and Crafts; Harvesting and Processing Beeswax; Other Bee Products: Bee Venom, Bee Brood, Bee Bread.

Unit – IV

4.1 Importance of Pollination in Agriculture and Ecosystems; Decline in Pollinators and Impact on Food Security; Bee-Friendly Farming Practices.

4.2 Common Pests and Diseases Affecting Bee Colonies; Non-Chemical Pest Control Methods.

4.3 Principles of Organic Beekeeping: Avoiding Chemical Inputs; Organic Hive Management Techniques: Hygienic Behaviors, Natural Swarming; Challenges and Benefits of Organic Beekeeping.

4.4 Value-added Bee Products: Honey, Pollen, Propolis Skincare Products; Marketing and Branding for Bee Products; Export Opportunities and International Trade Regulations for Bee Products

Course Outcomes

1. Gain a comprehensive understanding of the historical significance and cultural importance of apiculture, beekeeping practices, and the role of bees in pollination.
2. Identify and analyze the characteristics, behavior, and challenges faced by different bee species used in apiculture, with a focus on Apis Mellifera and indigenous bee species.
3. Demonstrate knowledge of the life cycle of bees, social structures within colonies, mechanisms of communication, foraging behavior, and the role of specialized bee structures.
4. Acquire a detailed understanding of the external anatomy of bees, metabolic processes involved in energy production and temperature regulation, and the significance of specialized bee structures.
5. Evaluate and compare different types of beehives, understanding their design, advantages, and suitability for different beekeeping purposes.
6. Develop proficiency in using essential beekeeping equipment and safety gear, ensuring proper hive inspection, manipulation, and personal protection.
7. Apply principles of apiary management, including site selection, hive orientation, inspection schedules, and swarm prevention techniques throughout the year.
8. Explore the diversity of bee products, their composition, properties, health benefits, and various applications in culinary, medicinal, skincare, and other fields, and understand their value in the market.

SUGGESTED READING MATERIAL:

1. "The Buzz about Bees: Biology of a Superorganism" by Jürgen Tautz (Publisher: Springer, 2008).
2. "The Honeybee Democracy" by Thomas D. Seeley (Publisher: Princeton University Press, 2010).
3. "The Practical Beekeeper: Beekeeping Naturally" by Michael Bush (Publisher: X-Star Publishing Company, 2011).
4. "The Hive and the Honey Bee" edited by Joe M. Graham (Publisher: Dadant & Sons, 2015).
5. "Bees: Their Vision, Chemical Senses, and Language" by Karl von Frisch (Publisher: Cornell University Press, 1967).
6. "The Backyard Beekeeper: An Absolute Beginner's Guide to Keeping Bees in Your Yard and Garden" by Kim Flottum (Publisher: Quarry Books, 2010).
7. "Hive Management: A Seasonal Guide for Beekeepers" by Richard E. Bonney (Publisher: Storey Publishing, 1990).
8. "The Complete Idiot's Guide to Beekeeping" by Dean Stiglitz and Laurie Herboldsheimer (Publisher: Alpha, 2004).

SEMESTER – III

SKILL ORIENTED COURSE-5

(SOC-5)-ZOO 305 (A): BIOANALYTICAL TOOLS AND TECHNIQUES - II

General Course Objectives:

While studying the Bioanalytical Tools and Techniques - II, the student shall be able to:

1. To study the different tools used in biology and research.
2. To learn about the operational handling and maintenance of laboratory instruments and glassware.
3. To study different types of Electrophoresis techniques used in biology.
4. To learn about different microscopic techniques and their application in biological research.
5. To study principles and types of isotypes their application in biological research.
6. To learn about the operational handling and maintenance of laboratory for Cell culture.

Unit - I

1.1 Electrophoretic Techniques: Discontinuous (Disc) Gel Electrophoresis; Gradient Electrophoresis -Two-Dimensional Gel Electrophoresis-Immunoelectrophoresis - PulseField Gel Electrophoresis.

1.2 Polymer Chain Reaction (PCR) : Basic principle and processing of PCR , types of PCRqPCR and Reverse transcriptase PCR(RT-PCR), Quantitative Real time PCR and applications of PCR.

1.3 Blotting techniques-Western Blotting, Southern Blotting and Northern Blotting techniques and their application.

1.4 DNA sequence methods- Sanger Method, Next generation sequencing.

Unit – II

2.1 Techniques of Chromatography - Plane Chromatography -Paper Chromatography - ThinLayer Chromatography.

2.2 Column Chromatography - Types of Chromatography - Adsorption Chromatography – Partition Chromatography-Liquid-Liquid Chromatography -Gas-Liquid Chromatography (GLC).

2.3 Gel Permeation Chromatography - Ion Exchange Chromatography - Affinity Chromatography.

2.4 High Performance Liquid Chromatography - Some Specialized Techniques - Hydroxyapatite Chromatography - An Affinity System for Base Dependent Fractionation of DNA - An Affinity System for Fractionating supercoiled and Non-Supercoiled DNA - DNA-Cellulose Chromatography

Unit – III

3.1 Radioactive Decay - Production of Isotopes - Synthesis of Labeled Compounds - Interaction of Radioactivity with Matter - Measurement of Radioactivity.

3.2 Methods Based Upon Gas Ionization - A. Ionization Chambers - B. Proportional Counters - C. Fundamentals of Geiger Counters.

3.3 Photographic Methods.

3.4 Methods Based Upon Excitation - A. Liquid Scintillation Counting - Use of Stable Isotopes in Biology - The Tracer Technique - Use of Isotopes as Tracers in Biological Sciences - Some Information About Commonly Used Isotopes - Safety Aspects - Dosimetry.

Unit – IV

4.1 The animal Cell Culture Laboratory, Equipment and sterilization of lab and aseptic methods.

4.2 Cell culture medium, Preparations, Types of animal cells, Culturing methods, Cryopreservation.

4.3 Cell viability, Dye exclusion and inclusion, Cytotoxicity, Apoptosis, Cell cycle assays.

4.4 Cell-Disruption Methods -Preliminary Purification Steps, Monitoringof Protein Purification, Drug discovery application of cell culture techniques.

Course Outcomes:

While studying the Bioanalytical Techniques II, the student shall be able to:

1. Students will understand the different tools used in biology and research.
2. Students would gain expertise the operational handling and maintenance of laboratory instruments and glassware.
3. Students would gain expertise different types of Electrophoresis techniques used in biology.
4. Students will understand different microscopic techniques and their application in biological research.
5. Students would gain expertise principles and types of isotypes their application in biological research.
6. Students would gain expertise about the operational handling and maintenance of laboratory for Cell culture

SUGGESTED READING MATERIAL:

1. Biologists Guide to Principles and Techniques of Practical Biochemistry, K. Wilson & K.W. Goulding, ELBS Edn.
2. Animal Cell Culture – A practical approach, Ed.John. R. W.Masters IRL Press.
3. General Zoological Microtechniques - P.M. Weesner.
4. Principles and techniques of Biochemistry and molecular biology by Kein Wilson and John Walker, VIII volume, Cambridge press Edition.

5. Neuro anatomical Techniques, N.J. Stransfed and T.A. Miller Springer Verlag, New York Heidelberg, Berlin.
6. Principles of NeuroPhychopharmacology- Robert S. Feldman, Jerrold S. Meyer and Lind F. Quenzer. Sinauer Associates, Inc. Publishers. Sunderland. Massachusetts.
7. Biophysical chemisty by Upadhyay – Upadhyay - Nath.
8. Analytical Biochemistry (Biochemical techniques) by Dr P. Asokan. Chinnaa publications.
9. Introduction to Instrumental analysis, Robert Braun. McGraw Hill International Edition.
10. Vogel's Qantitative Chemical Analysis by Vogel, ArthurI.

SEMESTER – III

SKILL ORIENTED COURSE-5

(SOC-5)-ZOO 305 (B): FORENSIC SCIENCE

General Course Objectives:

While studying the Forensic Science, the student shall be able to:

1. To make students understand the basics of biological material and its properties to aid in forensic investigations.
2. The Course aims to give basic knowledge to students about the concepts of Forensic Science.
3. The subject will also provide information to learners regarding the analysis procedures of various evidences of related to animal origin.

Unit – I

1.1 Forensic Science: Definition of Forensic Science, the Role of the Forensic Laboratory, History and Development of Forensic Science.

1.2 Pioneers in Forensic Science, Multidisciplinary nature, Forensic Technology solving crimes with advanced technology, Forensic intelligence and Interviews.

1.3 Forensic Evidences: Concise of Forensic Physical, Biological, Chemical and Psychological evidences, Medico-Legal Cases.

1.4 Laws and Principles of Forensic Science: Law of Exchange (Locard), Individuality, Comparison, Progressive Changes and Law of Probability, Branches of Forensic Science.

Unit – II

2.1 Forensic Biology: Types of biological evidences, identification, collection, preservation and significance.

2.2 Hair-morphology of hair, hair growth cycle, and its microscopic examination, determination of origin race, sex, body site.

2.3 Fibers: classification, characteristics, Forensic analysis of animal original fibers. Blood Composition and identification, species identification, blood grouping. Examination of semen evidences.

2.4 Sex chromatin. Biological characterization of saliva-visual examination, salivary amylase test. Identification of other body fluids like sweat, urine milk, and faecal matter.

Unit - III

3.1 Environmental Forensics: Definition, Legal processes involving environmental forensic science. Geo-forensics Global Positioning System; Basic principles and applications.

3.2 Biometrics in Personal Identification: Introduction, Concepts of Biometric Authentication, Role in person Identification.

3.3 Techniques and Technologies (Finger Print Technology, Face Recognition, IRIS, Retina

Geometry, Hand Geometry, Speaker Recognition, Signature Verification and other forensic related techniques).

3.4 Forensic Toxicology: Definition, Areas of Forensic Toxicology, Elements of Forensic Toxicology Nature of cases, Role of the Forensic Toxicologists, Laws related to Forensic Toxicology.

Unit - IV

4.1 Forensic Significance of DNA profiling: Applications in disputed paternity cases, child swapping, missing person's identity- civil immigration, veterinary.

4.2 Wildlife and agriculture cases, legal perspectives- legal standards for admissibility of DNA profiling, procedural and ethical concerns.

4.3 Status of development of DNA profiling, New and future technologies: DNA chips, SNPs and limitations of DNA profiling.

4.4 Forensic Psychology and the Law, Civil and criminal case assessment, Mental disorders, Eye witness testimony, Criminal profiling- need and types, Forensic Scientific evidence, Genetics and Crime, Serial murders.

Course Outcomes:

After the completion of the course, a student will be able to achieve these outcomes:

1. Students will be able to understand about the history and background of Forensic Science.
2. Learners will be able to understand the crime science managements and knowledge about the handling of crime exhibits.
3. Student will be skilled forensic biologists so as to gain the knowledge of forensic analysis of biological evidences to help investigating agencies.
4. Student will be skilled forensic biologists so as to gain the knowledge of forensic analysis of biological evidences to help investigating agencies.
5. Students will able to understand microscopic and macroscopic examination of biological samples like hair, fibers, diatoms recovered from crime scene.
6. It will explicate the insect development and geographical distribution for assistance in estimating the time since death and locating the probable crime scene.

SUGGESTED READING MATERIAL:

1. Nanda, B.B. and Tewari, R.K. (2001) Forensic Science in India: A vision for the twenty first Century Select Publisher, New Delhi.
2. James, S.H and Nordby, J.J. (2003) Forensic Science: An introduction to scientific and Investigative techniques CRC Press.
3. Bruce A. Arrigo (2000) Introduction to Forensic Psychology Academic Press, London.
4. J A Siegel, P.J Saukko (2000) Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press.

5. Richard Li. Forensic Biology: Identification and DNA Analysis of Biological Evidence, CRCPress.
6. Alan Gunn: Essential Forensic Biology, 2 nd Edition, John Wiley and Sons. 2009.
7. Forensic Science in Criminal Investigation & Trials – B.R.Sharma 2. The Hand Book of Forensic Psychology – Weiner Hass.
8. Koblinsky et al. (2005) DNA -Forensic and Legal Implications. 9. John M. Butler (2005) Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers Academic Press.
9. Curry (1986) Analytical Methods in Human Toxicology, Part II. 5. Curry, A.S. (1976) Poison Detection in Human Organs.
10. J A Siegel, P.J Saukko (2000) Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press. 2.
11. Sarett & Doll Toxicology (2003) The Basic Science of poisons.

SEMESTER – III

SKILL ORIENTED COURSE-6

(SOC-6)-ZOO 306 (A): PRINCIPLES AND PRACTICES OF AQUACULTURE

General Course Objectives:

While studying the Principles and Practices of Aquaculture, the student shall be able to:

1. This course will give the students an understanding of the principles, scope and basis of aquaculture.
2. Provide knowledge about preparation and management of pond.
3. The course will include an opportunity to conduct hands-on activities related to culture, health management, and processing of fish and shrimp
4. To get the job opportunities after the completion of this course.
5. To know about Culture methodologies with special reference to fish and prawn.

Unit - I

1.1 Definition, Scope and Basis of Aquaculture; History and present status of Aquaculture.

1.2 Culture systems: Freshwater aquaculture, Brackish water culture, Mariculture: Major cultivable species for aquaculture.

1.3 Culture practices - Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp. Monoculture, Poly-culture, Composite culture, Mono-sex culture and integrated fish farming.

1.4 Culture systems - Ponds, Raceways, Cages, Pens, Rafts and water re-circulating systems

Unit - II

2.1 Criteria for the selection of site for freshwater and brackish water pond farms. Seed resources: Natural seed resources and Procurement of seed for stocking: Selection of species for culture. Design and construction of aqua farms: Design and construction of aqua farms.

2.2 Management of culture ponds: Culture of Indian major carps – Nursery, Rearing and Production ponds. Stocking of open waters and Ranching.

2.3 Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization;

2.4 Stocking density and Post-stocking management – Feeding, water quality, growth and health care and harvesting of ponds.

Unit – III

3.1 Nutrition and feeds: Nutritional requirements of a cultivable fish and shellfish. Natural food and Artificial feeds and their importance in fish and shrimp culture.

3.2 Supplementary feeds; Feed additives and Preservatives; Role of probiotics.

3.3 Factors affecting the health in aquaculture. Major diseases of aquaculture species.

3.4 Disease diagnosis and health management: fish immunization and vaccination; Symptoms, prophylaxis and therapy of common diseases in fish and shrimp ponds.

Unit - IV

4.1 Processing and preservation of fish & shrimp and its by-products: Traditional methods - sun drying, salt curing, pickling, and smoking. Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze dry (AFD).

4.2 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants. Quality Control of fish and fishery products; pre-processing control, control processing and after processing.

4.3 Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

4.4 Sustainability and Environmental Management of Aquaculture.

Course Outcomes

On successful completion of this course students will be able to

1. Understand the different types of culture systems and culture practices.
2. Gain the Knowledge about the Preparation and management of pond.
3. Demonstrate the Knowledge of different concepts of Nutrition and health management of fishes and prawns.
4. Understand the concepts of processing and preservation of fish and shrimp and sustainability of environmental management.

SUGGESTED READING MATERIAL

1. Bardach, JE et al. 1972. Aquaculture – The farming and husbandry of freshwater and marine organisms, John Wiley & Sons, New York.
2. Jingran, V.G., 1991. Fish and fisheries of India, HPCorporation, New Delhi.
3. Pillay TVR.1990. Aquaculture- Principles and Practices, Fishing News Books Ltd., London.
4. ICAR. 2006. Hand Book of Fisheries and Aquaculture.
5. Ivar LO. 2007. Aquaculture Engineering. Daya Publ. House.
6. Jhingran V.G. 2007. Fish and Fisheries of India. Hindustan Publ. Corporation, India.
7. Landau M. 1992. Introduction to Aquaculture. John Wiley & Sons.
8. Lovell RT.1998. Nutrition and Feeding of fishes. Chapman & Hall.
9. Mcvey JP. 1983. Handbook of Mariculture. CRC Press.
10. New MB. 2000. Freshwater Prawn Farming. CRC Publ.
11. Honeybees and their management S. B. Withhead. Axis books Publisher, Jodhpur.

12. A Handbook of Beekeeping Dharamsing and D. P. Singh (, Agrobios India (Publisher), Jodhpur.
13. Hanumappa (1978): Sericulture for Rural Development, Himalaya Publications Delhi.
14. Bhatnagar, R.K. and Palpa, R.K. 1996 Vermiculture and Vermicomposting, Kalyani Publishers, New Delhi.
15. Arul K. Sharma, A Hand book of Organic farming, Agro, Bio. Jothpur, India.
16. Shukla, G.S. and Xupadhyay G.S. Economic Zoology, Rastogi Publications, Meerut.

SEMESTER – III

SKILL ORIENTED COURSE-6

(SOC-6)-ZOO 306 (B): GENETIC ENGINEERING

General Course Objectives:

While studying the Genetic Engineering course, the student shall be able to:

1. To introduce the principles, techniques, and applications of Genetic Engineering.
2. To understand the fundamentals of gene manipulation, recombinant DNA technology, and gene editing.
3. To explore the ethical, social, and environmental implications of Genetic Engineering.
4. To apply Genetic Engineering concepts in various sectors including healthcare, agriculture, and biotechnology.
5. To analyze the role of Genetic Engineering in biopharmaceutical production, gene therapy, and crop improvement.
6. To examine the current trends and future prospects of Genetic Engineering technologies

Unit – I

1.1 Evolution of Genetic Engineering: Historical Progression of Genetic Engineering, Contributions of Pioneering Scientists, Impact on Modern Biotechnology Practices.

1.2 Genetic Manipulation Techniques: Gene Isolation Methods, Advanced Transformation Techniques.

1.3 Precision Gene Editing Technologies (to be added), TALEN, Zinc Finger Nuclease.

1.4 Molecular Analysis of Genetic Variations: Genomic Sequencing,Strategies for Genetic Analysis, Study of Genetic Variation Techniques like RFLP, STR and SNP Analysis.

Unit – II

2.1 Toolbox of Genetic Engineering: Detailed Understanding of Restriction Enzymes, DNA Ligases, Gene Synthesis Procedures, Versatile Applications of PCR Techniques.

2.2 Creating Transgenic Organisms: Fundamentals of Transgenesis, Applications in Developing Transgenic Animals, Genetic Modifications for Trait Enhancement.

2.3 Gene Therapy Insights: Types of Gene Therapy Approaches, Innovative Gene Delivery Systems, Clinical Implementations in Therapeutic Gene Editing.

2.4 Genomic Manipulation in Evolution: Genetic Engineering Contributions to Evolutionary Studies, Impact on Understanding Species Differentiation, Genomic Adaptations Over Time.

Unit – III

3.1 Agricultural Genetics Advancements: Genetic Modification Interventions in Agriculture, Enhanced Crop Varieties, Techniques such as Gene Stacking for Crop Productivity.

3.2 Biopharmaceutical Production Innovations: Recombinant Protein Manufacturing,

Application of Bioreactors in Biopharmaceutical Industry.

3.3 Environmental Genetic Engineering Applications: Harnessing Genetic Modification for Bioremediation, Sustainable Biofuels Production using Engineered Microorganisms.

3.4 Ethical and Societal Aspects: Ethical Implications of Genetic Engineering Practices, Balancing Advancements with Bioethical Considerations, Institutional Biosafety Committees.

Unit – IV

4.1 Gene Regulation Mechanisms: Gene Silencing Techniques, Exploration of Transcription Factors in Gene Expression Regulation, Epigenetic Modifications Understanding and Implications.

4.2 Synthetic Biology Innovations: Designing Artificial Biological Systems, Utilization of Bioinformatics Tools in Designing Biological Constructs.

4.3 Societal Impact and Ethical Considerations: Navigating Bioethics in Genetic Engineering, Ensuring Ethical Conduct in Research and Applications, Intellectual Property Protection.

4.4 Futuristic Genetic Engineering Vistas: Exploring Future Applications of Genetic Engineering in Zoological Research.

Course Outcomes:

1. Thorough understanding of Genetic Engineering principles and technologies.
2. Proficiency in gene manipulation techniques and gene editing tools.
3. Ability to apply Genetic Engineering in various fields for practical applications.
4. Knowledge of the ethical implications and societal impacts of Genetic Engineering.
5. Understanding of how Genetic Engineering is utilized in healthcare, agriculture, and environmental sectors.
6. Skill development in genetic modification for beneficial purposes and problem-solving.
7. Awareness of the regulatory and safety considerations in Genetic Engineering practices.
8. Insight into the future advancements and emerging trends in Genetic Engineering.

Suggested Reading Material:

1. Molecular Cloning: A Laboratory Manual by Joseph Sambrook and David Russell.
2. Genetic Engineering: Principles and Methods by Jane K. Setlow.
3. Gene Cloning and DNA Analysis: An Introduction by T.A. Brown.
4. Biotechnology and Genetic Engineering by Pranav Kumar.
5. Synthetic Biology: A Primer by Geoff Baldwin and Drew Endy.

SEMESTER – III

Seminar /Tutorials /Remedial classes and Quiz as part of internal assessment

With Credits -

M.Sc., ZOOLOGY

(Effective from the batch of Student admitted during the Academic year 2024-25)

SEMESTER – IV

OPEN ONLINE SKILL DEVELOPMENT COURSE

(OOSDC) ZOO 401

- Open Online Skill Development Course (OOSDC) - Students can choose any two relevant courses of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL,etc., to get 4 credits.

SEMESTER – IV

OPEN ONLINE SKILL DEVELOPMENT COURSE

(OOSDC) ZOO 402

* Open Online Skill Development Course (OOSDC) - Students can choose any two relevant courses of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc., to get 4 credits

SEMESTER – IV

PROJECT WORK

(PW) ZOO 403

Project Work (PW) – with 12Credit

ANNEXURE IIA

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE

SULLURPET, TIRUPATI DISTRICT, ANDHRA PRADESH

ACCRIDITED BY NAAC WITH A GRADE

(Affiliated to Vikrama Simhapuri University,
Nellore)www.gdcsullurpet.edu.in,
sullurpet.jkc@gmail.com

DEPARTMENT OF ZOOLOGY, PG BOS MEETING ON 20th SEPTEMBER, 2025

MODIFICATIONS WITH JUSTIFICATION

Year	Semester	Course	Title of the course	Modification
I	I	101	Comparative Anatomy of Invertebrate & Chordata	No changes
		102	A. Cell Biology and Immunology B. Immunotechnology	No changes
		103	A. Comparative Animal Physiology B. Endocrinology	No changes
		105	A. Bioanalytical Tools and Techniques-1 B. Histology and Histochemistry	No changes
		106	A. Poultry science and management B. Economic Zoology	No changes
		107	Open online transdisciplinary course-1	No changes
		108	Indian Knowledge Systems-1	No changes
	II	201	Genetics and Evolution	No changes
		202	A. Biomolecules: Structure and function B. Neurobiology and Ethology	No changes
		203	A. Developmental biology B. Animal biotechnology	No changes
		205	A. Molecular Biology B.Medical biotechnology IPR, Biosafty and Bioethics	No changes
		206	A. Environmental biology B. EIA and Green Auditing	No changes
		207	Open online transdisciplinary course-2	No changes
		208	Indian Knowledge Systems-2	No changes
II	III	Core course -7	Applied Toxicology	No changes
		Core course -8	A. Enzymology & Metabolism B.Biostatistics and Bioinformatics	No changes
		Core course -9	A. Wildlife Conservation Biology and Field Techniques B. Apiculture	No changes
		Skill oriented course -5	A. Bioanalytical Tools & Techniques-II B. Forensic Science	No changes
		Skill Oriented Course -6	A. Principles and Practices of Aquaculture B. Genetic Engineering	No changes
		Core course -7	Applied Toxicology	No changes

P.V.Rani

Dr P. Victoria Rani
Chairman, Boad of Studies in zoology
Sri VSSC Government Degree college(A)
Sullurupeta, Andhra Pradesh

ANNEXURE III

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE

SULLURPET, TIRUPATI DISTRICT, ANDHRA PRADESH

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(Affiliated to Vikrama Simhapuri University, Nellore)

www.gdcsullurpet.edu.in, sullurpet.jkc@gmail.com

DEPARTMENT OF ZOOLOGY, SEMISTER I

BLUEPRINT AND MODEL QUESTION PAPERS FOR MSC ZOOLOGY

- SEMESTER I, **COMPARATIVE ANATOMY OF INVERTEBRATES AND CHORDATES (CORE COURSE-1)** BLUE PRINT
- SEMESTER I, **CELL BIOLOGY AND IMMUNOLOGY (CORE COURSE-2)** BLUE PRINT
- SEMESTER I, **IMMUNOTECHLOGY (CORE COURSE-2)**BLUE PRINT
- SEMESTER I, **COMPARITIVE ANIMAL PHYSIOLOGY (CORE COURSE-3)** BLUE PRINT
- SEMESTER I, **ENDOCRINOLOGY (CORE COURSE-3)** BLUE PRINT
- SEMESTER I, **BIO ANALYTICAL TOOLS AND TECHNIQUES (SKILL ORIENTED COURSE -1)** BLUE PRINT
- SEMESTER I, **HISTOLOGY AND HISTO CHEMISTRY (SKILL ORIENTED COURSE-1)** BLUE PRINT
- SEMESTER I, **POULTRY SCIENCE AND MANAGEMENT (SKILL ORIENTED COURSE -2)** BLUE PRINT
- SEMESTER I, **ECONOMIC ZOOLOGY (SKILL ORIENTED COURSE-2)** BLUE PRINT

DEPARTMENT OF ZOOLOGY, SEMISTER II
BLUEPRINT AND MODEL QUESTION PAPERS FOR MSC ZOOLOGY

- SEMESTER II, **GENETICS AND EVOLUTION (CORE COURSE-4)** BLUE PRINT
- SEMESTER II, **BIOMOLECULES: STURTURE AND FUNCTION (CORE COURSE-5)**BLUE PRINT
- SEMESTER II, **NEUROBIOLOGY AND ETHOLOGY (CORE COURSE-5)** BLUE PRINT
- SEMESTER II, **DEVELOPMENTAL BIOLOGY(CORE COURSE -6)** BLUE PRINT
- SEMESTER II, **ANIMAL BIOTECHNOLOGY (CORE COURSE-6)** BLUE PRINT
- SEMESTER II, **MOLECUAR BIOLOGY (SKILL ORIENTED COURSE -3)** BLUE PRINT
- SEMESTER II, **MEDICAL BIOTECHNOLOGY IPR, BIOSAFTEY AND BIOETHICS (SKILL ORIENTED COURSE -3)** BLUE PRINT
- SEMESTER II, **ENVIRONMENTAL BIOLOGY (SKILL ORIENTED COURSE -4)** BLUE PRINT
- SEMESTER II, **EIA AND GREEN AUDITING (SKILL ORIENTED COURSE -4)** BLUE PRINT
- SEMESTER II, **INDIAN KNOWLEDGE SYSTEMS -2 (AUDIT COURSE)** BLUE PRINT

DEPARTMENT OF ZOOLOGY, SEMISTER III
BLUEPRINT AND MODEL QUESTION PAPERS FOR MSC ZOOLOGY

- SEMESTER III, **APPLIED TOXICOLOGY (CORE COURSE-7)** BLUE PRINT
- SEMESTER III, **ENZYMOLOGY & METABOLISM (CORE COURSE-8)** BLUE PRINT
- SEMESTER III, **BIOSTATISTICS AND BIOINFORMATICS (CORE COURSE-8)**BLUE PRINT
- SEMESTER III, **WILDLIFE CONSERVATION BIOLOGY AND FIELD TECHNIQUES (CORE COURSE-8)** BLUE PRINT
- SEMESTERIII, **APICULTURE (CORE COURSE-9)** BLUE PRINT
- SEMESTER III, **BIO ANALYTICAL TOOLS AND TECHNIQUES-II (SKILL ORIENTED COURSE -5)** BLUE PRINT
- SEMESTER III, **FORENSIC SCIENCE (SKILL ORIENTED COURSE-5)** BLUE PRINT
- SEMESTER III, **PRINCIPLES AND PRACTICES OF AQUACULTURE (SKILL ORIENTED COURSE -6)** BLUE PRINT
- SEMESTER III, **GENETIC ENGINEERING (SKILL ORIENTED COURSE-6)** BLUE PRINT

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-1: COMPARATIVE ANATOMY OF INVERTEBRATES AND CHORDATES

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following questions (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE (A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-1: COMPARATIVE ANATOMY OF INVERTEBRATES AND CHORDATES

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following questions (4 x 5= 20 marks)

1 Species Concept.

2 Differences between Proterostomia and Dueterostomia.

3 Structure of Gill.

4 Bipinnaria larvae.

5 Integumentary derivatives of vertebrates.

6 Aortic arches.

7 Organs of vision in mammals.

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 Explain the patterns of feeding and digestion in lower metazoans

or

Describe the Water vascular system in Echinodermis

9 .Describe the comparison of circulatory system of Annelids and arthropods.

or

Explain the larval forms and their phylogenetic significance of Echinodermata.

10 Explain the skin structure and function in chordates.

or

Describe the comparative anatomy of heart in Vertebrates.

11 Describe the comparative anatomy of Reproductive system among Aves and Mammals.

or

Describe the structure and mechanism of hearing organs in mammals.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-2: CELL BIOLOGY AND IMMUNOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-2: CELL BIOLOGY AND IMMUNOLOGY

BLUE PRINT

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x 2 1/2 = 10 marks)

1 Active transport and Passive transport
2 Regulation of cell cycle
3 Bioenergetics
4 Notch signalling
5 Epitomes
6 Types of immunoglobulins
7 Types of Vaccines

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 Describe the organization of prokaryotic and Eukaryotic cells

or

Write an essay on cell cycle.

9 Write about the structure and functions of mitochondria

or

Write about the pathways of intracellular signaling

10 Write an essay on cells of the immune system.

or

Write a detailed note on immunoglobulins.

11 Write an essay on antigen – antibody interactions

or

Write about the transplantation and immune deficiency diseases.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-2: IMMUNOTECHNOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-2: IMMUNOTECHNOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$ = 10 marks)

1 immune tolerance

2 Role of Toll-like receptors in recognizing pathogen

3 Role of Immunofluorescence in diagnostics

4 Immunomodulators in disease management

5 Vaccination schedules and strategies

6 Pathophysiology of Allergic reactions

7 Immune Biomarkers for diagnostics and prognosis

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 Write about the Impact of erological tests in identifying specific antibodies in immune responses.

or

Explain the Role of marginal zone B cells in early antibody responses to blood-borne pathogens.

9 Explain the Applications of Monoclonal Antibodies in therapy, Immunomodulators in disease management.

or

Write about the Role of Biosensors in detecting pollutants and pathogens in ecosystems.

10 Explain the Genetic components of immune responses and Impact of polymorphisms on disease susceptibility.

or

Explain the Mechanisms of Immunodeficiency disorders and Pathophysiology of Allergic reactions.

11 Write about the Immune Biomarkers for diagnostics and prognosis

or

Write about the Integration of Immunoinformatics in predicting immune responses and designing novel therapies.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-3: COMPARITIVE ANIMAL PHYSIOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-3: COMPARITIVE ANIMAL PHYSIOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any four of the following (4 x $2\frac{1}{2}$ = 10 marks)

1 Intra cellular and extra cellular digestion.

2 Aim and scope of physiology.

3 Structure of Lung.

4 Osmoregulation in marine environment.

5 Hibernation and Aestivation.

6 Temperature regulation in poikilothermic animals.

7 Bioluminescnce.

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Describe the feeding mechanisms and regulation.

or

Describe the physiology of Digestion and Digestive enzymes.

9 Explain the types of Respiration, Respiratory organs and mechanism of Respiration.

or

Write an essay on Osmoregulation.

10 Describe the temperature regulation in Homoeothermic animals.

or

Write a detailed note on Biological rhythms.

11 Write about the chromatophores and regulation of their functions.

or

Write about the muscle structure and function and correlation.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-3: ENDOCRINOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$= 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

CORE COURSE-3: ENDOCRINOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$= 10 marks)

1 Historical Perspective on Endocrinology.

2 Amine Hormones.

3 Mechanisms of Hormone Synthesis.

4 Role of Neuroendocrine System.

5 Diagnostic Techniques for Endocrine Disorders

6 Hypo and Hyperthyroidism.

7 Testosterone Function in Males

.

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 Explain the Importance of the Endocrine System in Organisms.

or

Describe about the Endocrine Glands and Hormonesin the Human Body.

9 Explain about the Synthesis of Steroid Hormones in Endocrine Organs.

or

Write about the Neurotransmitters and Neuropeptides in Endocrine Signaling.

10 Write about the Diagnostic Techniques for Endocrine Disorders.

or

Explain the Causes and Symptoms of Hypothyroidism and Hyperthyroidism

11 Write about the Role of Gonadotropins in Reproductive Endocrinology.

or

Write about the Androgen Receptor Signaling in Male Reproductive System.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-1: BIO ANALYTICAL TOOLS AND TECHNIQUES-1

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-1: BIO ANALYTICAL TOOLS AND TECHNIQUES-1

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x2 $\frac{1}{2}$ = 10 marks)

1 Biochemical buffers.

2 Enumeration of soil bacteria.

3 Differential centrifugation.

4 Types of centrifuges and rotors

5 Denaturing agarose gel electrophoresis.

6 Sotheren blotting technique.

7 Types of isotopes.

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Write about the Cell disruption methods.

or

Write an essay on Aseptic techniques.

9 Write about the Preparative ultra centrifugation.

or

Write about the General principles and definitions of separation methods.

10 Write about the Preparation, Separation and Determination of molecular size of DNA by using Agarose gel electrophoresis.

or

Write a detailed note on Blotting techniques.

11 Write a detailed note on Radioisotope techniques.

or

Explain about the processing of Tissues.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-1: HISTOLOGY AND HISTO CHEMISTRY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-1: HISTOLOGY AND HISTO CHEMISTRY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x $2\frac{1}{2}$ = 10 marks)

1 Functions of epithelial tissue.

2 Bone and bone marrow.

3 Structure and function of brain cells.

4 Metachromatic dyes and staining.

5 Histochemical Techniques.

6 Immunofluorescence.

7 Proteins and Glycoproteins.

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Explain the objectives and applications Histopathology.

or

Explain the Histology of different types of muscle.

9 Explain the types, structure and function of brain cells (CNS and PNS) and Structure of neuron.

or

Explain the Classification and properties of dyes.

10 Explain about the Utility of classical histochemical Techniques.

or

Explain about the Immunofluorescence techniques for localization of proteins in endocrine cells.

11 Explain the types of degeneration clouding, hyaline, hydrophic and fatty degeneration..

or

Explain the Principles and mechanism for the Identification of Total Proteins and Glycoproteins.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-2: POULTRY SCIENCE AND MANAGEMENT

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-2: POULTRY SCIENCE AND MANAGEMENT

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$ = 10 marks)

1 Role of egg and meat in human nutrition

2 Feather sexing.

3 1 + 3 system and its advantages.

4 Californian cages.

5 Feed additives.

6 Vitamin D Deficiency diseases.

7 Debeaking.

SECTION – B

Answer any all of the following questions (4 x 10 = 40 marks)

8 Write an essay on poultry manure and byproducts.

or

Write about the sexing in one day old chicks.

9 Write a detailed note on poultry housing.

or

Write an essay on management of cage birds.

10 Explain the home made mineral mixture of feed for chick grower- layer- broiler and finisher.

or

Write about the nutrition deficiency diseases in poultry birds.

11 Write about the management of growers , layers and broilers.

or

Write about the poultry diseases and control measures.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-2: ECONOMIC ZOOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x2 $\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

SKILL ORIENTED COURSE-2: ECONOMIC ZOOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x $2\frac{1}{2}$ = 10 marks)

1 Exotic and Endemic species of Aquarium Fishes.

2 sexual dimorphism of Freshwater Aquarium fishes

3 Sericulture Industry in India.

4 Species of silkworm.

5 Vermicompost.

6 Economic importance of Vermiculture.

7 Pearl culture.

SECTION – B

Answer any all of the following (4 x 10 = 40 marks)

8 Write about the Biology of Aquarium Fishes, common characters, and sexual dimorphism of Freshwater and Marine Aquarium fishes.

or

Write a detailed note on General Aquarium maintenance, budget for setting up an Aquarium.

9 Write about the History, scope, and prospective status of Sericulture Industry in India..

or

Write about the economic opportunities and challenges in the Sericulture Industry..

10 Write about the Different methods of Vermiculture.

or

Describe about the economic importance of Vermiculture.

11 Write about the Morphology of different breeds of Chicken, Brooding and Rearing of Chicks, Egg and Meat processing in Poultry.

or

Write about the Dairy farm management.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER I

AUDIT COURSE: INDIAN KNOWLEDGE SYSTEMS-1

BLUE PRINT

Time: 3 Hours **Max. Marks: 100**

SECTION – A

Answer any Four of the following questions (4 x 10= 40 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

8 From Unit IV

SECTION – B

Answer all of the following questions (4 x 15 = 60 marks)

9 (a) From Unit I

OR

(b) From Unit I

10 (a) From Unit II

OR

(b) From Unit II

11 (a) From Unit III

OR

(b) From Unit III

12 (a) From Unit IV

OR

(b) From Unit IV

SRIV.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, SULLURPET (A)

M.Sc ZOOLOGY

(ZOOLOGY I SEMESTER AUDIT COURSE)

INDIAN KNOWLEDGE SYSTEMS- I

Time: 3 Hours **Max.Marks:100M**

SECTION–A

Answer any FOUR of the following questions (4 x10 =40marks)

1. What is the definition of Indigenous or Traditional Knowledge?
2. Mention any two reasons why Traditional Knowledge is important.
3. What are the six Vedangas, and why are they important?
4. Name the two great Indian epics and briefly describe their significance in Indian tradition.
5. What is the significance of the great Himalayas in Ancient India's natural heritage?
6. How did ancient Indians use traditional knowledge to adapt to and understand climate?
7. What are Gunas and Doshas in Ayurveda, and how do they influence health?
8. Name two important Ayurvedic texts and their significance in traditional medicine.

SECTION–B

Answer the following questions (4x15 =60 marks)

9. (a) Discuss the concept of Indian Knowledge Systems (IKS). Highlight its scope, importance, and relevance in the modern world.

or

(b) Define Indigenous/Traditional Knowledge. Explain its characteristics and the role it plays in sustainable development and cultural preservation

10. (a) Explain the significance of the Vedas and their components in shaping Ancient Indian knowledge. Discuss the role of the Vedangas in preserving Vedic traditions.

or

(b) Analyze the cultural, ethical, and philosophical contributions of the Ramayana and Mahabharata to Indian heritage knowledge.

11. (a) Discuss the significance of the Sindhu-Ganga and Brahmaputra valley civilizations in the context of Ancient India's natural heritage and their contributions to Indian culture.

or

(b) Explain the role of ancient Indian traditional knowledge in understanding and preserving nature, forests, minerals, and climate.

12. (a) Explain the fundamental principles of Ayurveda, including Gunas, Doshas, Pancha Mahabhuta, and Sapta Dhatu. Discuss their role in maintaining health and treating diseases.

or

(b) Analyze the contribution of Ayurveda and Yoga to modern health sciences, highlighting the concept of Dinacharya, Ritucharya, and the significance of ancient Ayurvedic texts.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COURSE-4: GENETICS AND EVOLUTION

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COURSE-4: GENETICS AND EVOLUTION

MODEL QUESTION PAPER

Time: 3 Hours **Max. Marks: 60**

SECTION–A

Answer any FOUR of the following questions (4 x 5 =20marks)

1. Bombay Blood group.
2. Tetrad analysis .
3. Down's syndrome.
4. Artificial insemination .
5. Lamarckism
6. Geographical isolation
7. Genetic drift

SECTION–B

Answer the following questions (4x10 =40marks)

8. (a)Write an essay on Methods of Microbial genetic transfers

OR

(b) Describe the gene mapping methods

9.(a) Explain the chromosomal aberrations and their implications

OR

(b) Write an essay on Pedigree Analysis

10(a) Write an essay on Neo Darwinism

OR

(b) Define Isolation. Explain the types and role of Isolation mechanisms in organic evolution

11(a) Write a detailed note on Destabilizing forces

OR

(b)Write an essay on Origin and Evolution of man

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COURESE-5: BIO MOLECULES: STRUCTURE AND FUNCTIONS

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x $2\frac{1}{2}$= 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COURESE-5: BIO MOLECULES: STRUCTURE AND FUNCTIONS MODEL

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION–A

Answer any FOUR of the following questions (4 x2 ½ =10marks)

1. Buffers
2. Triacylglycerols
3. Non essential Amino acids
4. Solid-phase technique for peptide synthesis
5. Isolation of protein
6. Ramachandran Plot
7. Differences between DNA and RNA

SECTION–B

Answer the following questions (4x 10 = 40marks)

8.(a) Describe the classification, structure and properties of carbohydrates.

OR

(b) Describe the physico-chemical priorities and analysis of fats and oils

9.(a) Describe the classification of Essential and Non- Essential Amino acids

OR

(b) Describe the physical and chemical properties of Amino acids

10(a) describe the classification and structure of Proteins

OR

(b) Explain the forces and bonds responsible for protein stability

11 (a) Write an essay on Nucleic acids

OR

(b) Describe the structure and types of RNA

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COURSE -5: NEUROBIOLOGY AND ETHOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x2 ½ =10marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

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M.Sc ZOOLOGY SEMESTER II

CORE COURSE -5: NEUROBIOLOGY AND ETHOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any four of the following questios (4 x2 ½ =10marks)

1 Types of nerve cells

2 Types of Synapses.

3 CNS barriers

4 Alzheimer's disease

5 Concept of Animal behavior

6 Social organization in insects

7 Red integrative memory

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 Write about the Micro anatomy of neurons and types of nerve cells.

or

Explain the Morphology and types of Synapses.

9 Explain the Chemical composition of the nervous system .

or

Describe about the Alzheimer's disease, Parkinson's disease and schizophrenia.

10 Explain the concept of Animal behavior

or

Explain the Social organization, Advantages, Social organization in insects.

11 Write about Cognitive Learning

or

Explain the nature of forgetting.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COUSE -6: DEVELOPMENTAL BIOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x2 ½ =10marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COUSE -6: DEVELOPMENTAL BIOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION–A

Answer any FOUR of the following questions (4 x2 ½ =10marks)

1. Structure of sperm
2. Fate maps
3. Factors effecting cleavage
4. Mammalian gastrulation
5. Morphogenic movements
6. Amphibian limb regeneration
7. Infertility in female

SECTION–B

Answer the following questions (4x 10 = 40marks)

8(a) Write an essay on Oogenesis

OR

(b) Write an essay on formation and structure of Acrosome

9(a) Write an essay on cell differentiation

OR

(b) Write an essay on types and formation of placenta in mammals

10(a) Describe the Nucleus and cytoplasmic interaction in embryonic development

OR

(b) Write an essay on Hormonal regulation of metamorphosis in amphibians and insects

11(a) Write about the chromosomal sex determination in mammals

OR

(b) Describe the theories of Ageing and influence of telomere on Ageing

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COUSE -6: ANIMAL BIOTECHNOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x2 ½ =10marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

CORE COUSE -6: ANIMAL BIOTECHNOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any four of the following questions (4 x2 ½ =10marks)

1 DNA ligases.

2 Gene cloning

3 Types of Stem Cells

4 Principle of gene transfer

5 Manipulation of reproduction in animals

6 Microinjection

7 Hypophysiation

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 Explain the concept of Cloning vectors

or

Write about Fluorescence in-Situ Hybridization (FISH) and immunological test

9 Explain the Applications of cell culture in Veterinary

or

Explain the principle of gene transfer.

10 Describe the Manipulation of reproduction in animals

or

Explain the models for various diseases/disorders.

11 Describe the stem cell technology for betterment of aquaculture

or

Explain the Fresh water and marine (oyster) pearl culture technology.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COURSE 3 : MOLECULAR BIOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x2 ½ =10marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

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M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COURSE 3 : MOLECULAR BIOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION–A

Answer any FOUR of the following questions (4 x2 ½ =10marks)

1. Cot Value
2. SOS repair
3. DNA polymerase
4. Bidirectional replication
5. Processing of mRNA in prokaryote and Eukaryotes
6. Genetic Code
7. Lack operon

SECTION–B

Answer the following questions (4x 10 = 40marks)

8(a) Describe the nuclear and mitochondrial genome

OR

(b) Write about the DNA damage and repair mechanisms

9(a) Write about the replication in prokaryotes

OR

(b) Write about the discontinues replication

10(a) Explain the enzymes and molecular mechanisms involved in transcription

OR

(b) Write about the role of antibiotics in protein synthesis

11(a)Write a detailed note on genetic regulation

OR

(b)Write a detailed not on DNA sequencing and DNA fingerprinting

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COUSE -3: MEDICAL BIOTECHNOLOGY IPR, BIOSATEY AND BIOETHICS

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x2 ½ =10marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COUSE -3: MEDICAL BIOTECHNOLOGY IPR, BIOSATEY AND BIOETHICS

MODEL QUESTION PAPER

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any four of the following questions (4 x2 ½ =10marks)

1 Detection of genetic.

2 Gene therapy

3 Different signaling for development

4 Animal cell Culture methods

5 Assay of viral particles

6 Biosafety

7 Bio-accelerators

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a)Explain the Detection of genetic, Neurogenetic disorders involving Metabolic and Movement disorders.

or

(b)Explain the mutations in neoplastic diseases.

9 (a)Explain about the fertilization and organogenesis .

or

(b)Write about the Transgenic and knockout systems .

10 (a)Explain the Classification and modes of propagation

or

(b)Write about the Patent rights and Special Topics Biotechnology R & D and industry.

11 (a) Describe about the Role of bioethics in research

or

(b)Explain the management of chemical and biological hazards associated with research

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COUSE -4: ENVIRONMENTAL BIOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x2 ½ =10marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COUSE -4: ENVIRONMENTAL BIOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION–A

Answer any FOUR of the following questions (4 x2 ½ =10marks)

1. Biomes
2. Definition Types of Environment
3. Energetic of ecosystem
4. Biomagnification
5. Bhopal gas tragedy
6. Chernobyl nuclear disaster
7. Bio Indicators

SECTION–B

Answer the following questions (4x 10 = 40marks)

8(a) Write about the classification, characteristics and stratification of fresh water ecosystem

OR

(b) Write about the classification, characteristics and stratification of forest ecosystem

9(a) Write an essay on energy flow in an ecosystem

OR

(b) Explain the methods of measuring productivity for different ecosystems

10(a) Write an essay on health hazards and toxicology of air pollution and related episodes in India and abroad

OR

(b) Explain the environmental los in India

11(a) Write about the methods, socio economic effects and impacts of Environmental Impact Assessment (EIA)

OR

(b) Write an essay on Environmental applications of Bioremediation

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COUSE 4: EIA AND GREEN AUDITING

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following questions (4 x2 ½ =10marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

SKILL ORIENTED COUSE 4: EIA AND GREEN AUDITING

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any four of the following questions (4 x2 ½ =10marks)

1 Elements of EIA.

2 Ad-hoc methods.

3 Procurement of relevant soil quality .

4 EIA in surface water.

5 Deforestation .

6 Assessment of Impact significance .

7 Stages of Environmental Audit

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 Write about Environmental Impact Assessment

or

Describe the Environmental Impact Assessment methods.

9 Describe the Methodology for the assessment of soil and ground water, Delineation of area

or

Write about Assessment of Impact significance, Identification and incorporation of mitigation measures.

10 Write a detailed note on development Activities on Vegetation and wildlife

or

Write about the Procurement of relevant soil quality, Impact prediction.

11 Explain about the Types of environmental Audit, Audit protocol

or

Write about the Case Studies and Preparations of Environmental Impact Assessment statement for various Industries.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

AUDIT COUSE: INDIAN KNOWLEDGE SYSTEMS-2

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following questions (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following questions (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPETA

M.Sc ZOOLOGY SEMESTER II

AUDIT COUSE: INDIAN KNOWLEDGE SYSTEMS-2

MODEL QUESTION PAPER

Time: 3 Hours **Max.Marks:60**

SECTION–A

Answer any FOUR of the following questions (4 x5 =20marks)

1. Panchanga
2. Luni- Solar system
3. Lunar Eclipse
4. Sthapatya - Veda
5. Mohan Jo Daro
6. Solar Eclipse
7. Indigenous religion

SECTION–B

Answer the following questions (4x 10 = 40marks)

8(a) Write about the Indigenous faith and religion

OR

(b) Write about the preservation of culture and indigenous knowledge

9(a) Write about the Solar and Lunar Eclipses

OR

(b) Write about the Panchanga and Adhikamasas

10(a) Explain the Indigenous tools and techniques for town planning and temple architecture

OR

(b) Explain the Ancient Indian architecture

11(a) Explain the significance of Indian agriculture in human civilization

OR

(b) Explain the Historical significance of agriculture and sustainable farming in India

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-7: APPLIED TOXICOLOGY

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-7: APPLIED TOXICOLOGY

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 Toxic kinetics.

2 Bio-magnification

3 Reactive Oxygen Species (ROS)

4 Antioxidant defense mechanism

5 Hepatotoxicity

6 Lesions of neural tissue.

7 Case studies of DDT

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Write about the classification of Toxic agents.
or
Write about the absorption and distribution of toxicants.

9 Write about the mechanism and reactions of toxicans.
or
Write about the xenobiotic induced intracellular and cellular alterations.

10 Write a detailed note on Hepatotoxicity.
or
Write an essay on effect toxic agents on neurons.

11 Write about the toxicity of organochlorine and organophosphate pesticides
or
Write an essay on legislation and regulation of toxic agents and toxicity.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-8: ENZYMOLOGY & METABOLISM

BLUE PRINT

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x 2 $\frac{1}{2}$= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE, COLLEGE, SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-8: ENZYMOLOGY & METABOLISM

MODEL QUESTION PAPER

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x 2 $\frac{1}{2}$= 10 marks)

1 Nomenclature of enzymes

2 Isolation of enzymes

3 Allosteric Inhibition

4 Enzymes in clinical diagnosis

5 Gluconeogenesis

6 Biosynthesis of Urea

7 Adenosine deaminase deficiency

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Write an essay on enzymes specificity and isolation of enzymes.
or
Write about the kinetic properties of enzymes.

9 Write about the inhibition of enzyme activity..
or
Explain the mechanism of enzyme action.

10 Write about the TCA cycle and their biomedical importance.
or
Write about the biosynthesis of long chain fatty acids.

11 Write about the biosynthesis of nucleotides
or
Write about the types and function of Porphyrins

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-8: BIOSTATISTICS AND BIOINFORMATICS

BLUE PRINT

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x 2 $\frac{1}{2}$= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-8: BIOSTATISTICS AND BIOINFORMATICS

MODEL QUESTION PAPER

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x 2 $\frac{1}{2}$= 20 marks)

1 Biostatistics

2 Types of relationship

3 Null and alternative hypothesis

4 Concept of ANOVA

5 Tools for web search

6 HTML

7 Types of BLAST

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) Explain the Standard deviation and co-efficient of variation

or

(b) Write about the Simple regression lines and its interpretation

9. (a) Write about Normal probability distribution and its applications.

or

(b) Explain the power of test and P value of a test.

10. (a) Describe about the Scope, importance and status of Bioinformatics

or

(b) Write about Sources of websites

11. (a)Write about Prediction of protein structure and protein folding

or

(b)What is BLAST? Write about the BLAST and types of BLAST

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-9: WILDLIFE CONSERVATION BIOLOGY AND FIELD TECHNIQUES

BLUE PRINT

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x2 $\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-9: WILDLIFE CONSERVATION BIOLOGY AND FIELD TECHNIQUES

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x $2\frac{1}{2}$ = 10 marks)

1 Wildlife heritage of India

2 Commensalism

3 Biosphere reserves

4 Translocation of wild animals

5 Habitat manipulation

6 Direct count method for population estimation.

7 Applications of audio recordings

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Explain the reasons for wildlife depletion in the Indian context.

or

Write about the human-animal conflicts.

9 Explain the role of government and non- government organizations in the conservation of wildlife.

or

Explain the wildlife management before and after implementation of wildlife protection act 1972.

10 Write an essay on vegetative analysis.

or

Write about the techniques for photographing of animals.

11 Write about the various audio recording techniques in wildlife conservation.

or

Write about use and application of remote sensing in wildlife conservation.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-9:APICULTURE

BLUE PRINT

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x 2 $\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

CORE COURSE-9: APICULTURE

MODEL QUESTION PAPER

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x 2 $\frac{1}{2}$ = 10 marks)

1 Role of Bees in Pollination

2 Species in Apiculture.

3 Suitability for Natural Comb Building

4 Winter Hive Management

5 Medicinal Properties of Honey

6 Uses of Beeswax in Cosmetics

7 Non-Chemical Pest Control Methods

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Write about the Characteristics and Behavior of Apis Mellifera
or
Write about Indigenous Bee Species Used in Different Regions

9 Write about the Importance of Protection in Beekeeping.
or
Write about Queen Assessment and Brood Inspection

10 Write about Culinary Uses of Different Honey Varieties
or
Explain about Composition and Properties of Beeswax

11 Explain the Importance of Pollination in Agriculture and Ecosystems
or
Explain the Export Opportunities and International Trade Regulations for Bee Products

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -5: BIOANALYTICAL TOOLS & TECHNIQUES-II

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x $2\frac{1}{2}$= 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE, COLLEGE, SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -5: BIOANALYTICAL TOOLS & TECHNIQUES-II

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x $2\frac{1}{2}$ = 20 marks)

1 Gradient Electrophoresis

2 Next generation sequencing

3 Affinity chromatography

4 Affinity System for Fractionating super coiled and Non-Super coiled DNA

5 Fundamentals of Geiger Counters

6 Use of Stable Isotopes in Biology

7 Dye exclusion and inclusion

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Write about the principles, types and applications of Blotting techniques.

or

Write about the basic principle, processing, types and applications of polymer chain reaction(PCR)

9 Write about the techniques of Chromatography.

or

Write a detailed note on Gel permeation chromatography.

10 Write an essay on Radioactive decay.

or

Write an essay on methods based upon excitation.

11 Write an essay on cell culture medium.

or

Write about the cell disruption methods.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE,(A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -5: FORENSIC SCIENCE

BLUE PRINT

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x 2 $\frac{1}{2}$ = 10 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -5: FORENSIC SCIENCE

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 Definition of Forensic Science

2 Law of Exchange (Locard)

3 Types of biological evidences

4 Forensic analysis of animal original fibers

5 Basic principles and applications

6 Role of the Forensic Toxicologists

7 procedural and ethical concerns.

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Explain the History and Development of Forensic Science

or

Describe the Branches of Forensic Science

9 Write about Forensic analysis of animal original fibers.

or

Explain the Biological characterization of saliva-visual examination

10 Explain the Geo-forensics Global Positioning System

or

Describe the Concepts of Biometric Authentication

11 Explain about the missing person's identity- civil immigration

or

Explain about the Criminal profiling- need and types, Forensic Scientific evidence, Genetics and Crime, Serial murders.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -6: PRINCIPLES AND PRACTICES OF AQUACULTURE

BLUE PRINT

Time: 2 $\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -6: PRINCIPLES AND PRACTICES OF AQUACULTURE

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 Mariculture

2 Mono-sex culture and integrated fish farming.

3 Algal blooms

4 Natural seed resources

5 Role of probiotics

6 Fish immunization and vaccination

7 Personal hygiene in processing plants.

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Write an essay on history and present status of aquaculture.
or
Write about the culture practices of fish and shrimp in aquaculture.

9 Write about the criteria for the selection of site for freshwater and brackishwater pond farms.
or
Write about the stocking density and post stocking management in aquaculture.

10 Write an essay on nutritional requirements of a cultivable fish and shellfish.
or
Write about the factors affecting the health in aquaculture.

11 Write about the advanced methods of processing and preservation of fish and shrimp and their byproducts.
or
Write about the Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -6: GENETIC ENGINEERING

BLUE PRINT

Time: $2\frac{1}{2}$ Hours **Max. Marks: 60**

SECTION – A

Answer any Four of the following (4 x 5= 20 marks)

1 From Unit I

2 From Unit I

3 From Unit II

4 From Unit II

5 From Unit III

6 From Unit III

7 From Unit IV

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 (a) From Unit I

OR

(b) From Unit I

9 (a) From Unit II

OR

(b) From Unit II

10 (a) From Unit III

OR

(b) From Unit III

11 (a) From Unit IV

OR

(b) From Unit IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE, (A) SULLURPET

M.Sc ZOOLOGY SEMESTER III

SKILL ORIENTED COURSE -6: GENETIC ENGINEERING

MODEL QUESTION PAPER

Time: $2\frac{1}{2}$ Hours **Max. Marks: 50**

SECTION – A

Answer any Four of the following (4 x $2\frac{1}{2}$= 10 marks)

1 Genetic Engineering

2 TALEN

3 DNA Ligases.

4 Types of Gene Therapy Approaches.

5 Enhanced Crop Varieties.

6 Institutional Biosafety Committees.

7 Gene Silencing Techniques

SECTION – B

Answer all of the following (4 x 10 = 40 marks)

8 Explain the Gene Isolation Methods and Advanced Transformation Techniques.

or

Write about the Molecular Analysis of Genetic Variations.

9 Explain the Versatile Applications of PCR Techniques.

or

Explain the Genomic Adaptations over Time

10 Explain the Techniques such as Gene Stacking for Crop Productivity

or

Write about the Sustainable Biofuels Production using Engineered Microorganisms.

11 Write about the Epigenetic Modifications Understanding and Implications.

or

Write about the Intellectual Property Protection.

ANNEXURE-IV

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE

SULLURPET, TIRUPATI DISTRICT, ANDHRA PRADESH

ACCRIDITED BY NAAC WITH A GRADE

(Affiliated to Vikrama Simhapuri University,
Nellore)www.gdcsullurpet.edu.in,
sullurpet.jkc@gmail.com

DEPARTMENT OF ZOOLOGY (M.Sc)

ASSESSMENT AND EVALUATION PROCEDURE

The College has a system of Continuous Internal Assessment (CIA) and Semester End Examination (SEE). The ratio between CIA and SEE is 40:60 for all 100 marks courses.

Continuous Internal Assessment

- The CIA is based on consists of tests, assignments, seminars, projects, etc. Allotment of marks is distributed as the following:

Mid-Semester Test 1	:	20 marks
Mid-Semester Test 2	:	20 marks
Seminar/GD	:	10 marks
Project	:	10 marks
Peer group learning /Assignments	:	10 marks
Attendance/Participation in clean and green programme	:	05 marks
Total	:	75 marks

- 75 marks scale down to 40 marks

Semester End Examination (SEE)

- Semester End Examination (SEE) will be conducted at the end of the semester for 60 marks.

Semester evaluation (SEE)

- For the papers of Semester III and IV, the examinations will be manual. The Examination we be conducted with the short Questions and essay Questions taken from the approved syllabus.

Minimum marks

- The student requires 16 marks for internal examinations and 24 marks for external examinations, for a total of 40 marks to pass the 100-mark examination and 20 marks to pass the 50-mark examination.

Practical examinations

- At the end of the semester, there will be a practical exam for worth fifty marks. Exams will be conducted by an external examiner.
- Marks allotted to the practical examination

Record	:	10 marks
Disation and display	:	20 marks
Identification of Spotters And slides	:	15 marks
Viva voce	:	05 marks

Dr P. Victoria Rani
Chairman, Board of Studies in zoology
Sri VSSC Government Degree college (A)
Sullurupeta, Andhra Pradesh

ANNEXURE-V

SRI V.S. SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE (A)

SULLURPET, TIRUPATI DISTRICT, ANDHRA PRADESH

ACCRIDITED BY NAAC WITH A GRADE

(Affiliated to Vikrama Simhapuri University, Nellore)

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DEPARTMENT OF ZOOLOGY, LIST OF EXAMINERS

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Dr P. Victoria Rani
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Sri VSSC Government Degree college (A)
Sullurupeta, Andhra Pradesh

ANNEXURE-VII

SRI V.S.SIVALINGAM CHETTIAR GOVERNMENT DEGREE COLLEGE (A)
SULLURPET, TIRUPATI DISTRICT, ANDHRA PRADESH

ACCRIDITED BY NAAC WITH A GRADE
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DEPARTMENT OF ZOOLOGY (M.Sc)

ACTIVITES FOR THE ACADEMIC YEAR 2025-26

Departmental events not only foster personal development, but also give students the practical experience and employability skills necessary to thrive in this competitive environment. The Zoology Department organizes a variety of annual activities to assist students' general growth. Students who preferred participated enthusiastically in these events and gained knowledgefrom them. We have planned some of the activities for the academic year 2025–26.

- Each semester, at least two guest lectures.
- One workshop, One Seminar, and awareness programmes on wild life management, migratory birds, environment etc..
- Two field trips,

  1. Sri Venkateswara zoological park in Tirupati to observe various animal species and their characters
  2. Nelapattu bird sanctuary at Nelapattu, Pulicat bird sanctuary at Attakanitipa.
- To plan essay writing, poster presentations, and quizzes for significant occasions like World Animal day , World Environment day, World Wildlife Day, Ozone day, National Pollution Control day, World Water day, World Soild day, World Wildlife Conservation day, etc.
- To honor the contributions that Darwin, Mendel and Edward jenner made to the students on their birth anniversaries.

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