



SCHOOL OF SCIENCES-ZOOLOGY
M.Sc. Zoology Syllabus: Semester-IV
DSC-10: Medical and Veterinary Protozoology (Theory)

Semester: IV	Paper: Discipline Specific Course
Credit: 04	Paper Title: Medical and Veterinary Protozoology (Theory)
Instruction: 4hr/Wk	Paper Code: MSZY401CCT
Int. Assessment: 30	Semester Exam marks: 70
Course Objective	To study the morphology, classification, pathogenicity, diagnosis and control of various veterinary and medical important parasitic protozoans.
Course Outcome	The study will provide the understanding of clinical phase of infection, pathological conditions, diagnosis and treatment. The study will expand knowledge in the field of medical and veterinary protozoology and educating healthcare professionals, veterinarians, researchers, and the general public about protozoal diseases, their prevention, and control strategies. It will enhance the knowledge of interactions between protozoan parasites and their hosts, including factors influencing susceptibility, resistance, and disease outcomes.
UNIT-I Introduction to Protozoology	1.1: Definition of protozoa; classification and diversity based on their locomotion, mode of nutrition, and other characteristics
	1.2: Morphology and cell structure (cilia, flagella, pseudopodia, and pellicles)
	1.3: Organelles and their functions (nuclei, mitochondria, Golgi apparatus, and vacuoles)
	1.4: Physiological processes such as respiration, excretion, and locomotion (using flagella, cilia, or pseudopodia).
UNIT-II Biology and Diseases of Veterinary Important Protozoan	2.1: Nutrition and metabolism including phagocytosis, pinocytosis, and osmotrophy.
	2.2: Reproduction (asexual or sexual), with variation in reproductive modes among different taxa.
	2.3: Pathogenesis, mode of infections and diseases caused by <i>Babesia</i> sp. (Babesiosis), <i>Theileria</i> species (Theileriosis); <i>Eimeria</i> and other genera of coccidian parasites (Coccidiosis); <i>Neospora</i> (Neosporosis).
	2.4: Symptoms, diagnosis, and treatment.
UNIT-III Biology and Diseases of Medically Important Protozoan	3.1: Nutrition and metabolism among different medically important Protozoans
	3.2: Reproduction (asexual or sexual), with variation in reproductive modes among different taxa.
	3.3: Disease transmission including ingestion of contaminated food or water, vector-borne transmission, and direct contact with infected individuals or animals.
	3.4: protozoan pathogens include <i>Entamoeba</i> spp. (Amebiasis), <i>Plasmodium</i> spp. (malaria), <i>Trypanosoma</i> spp. (sleeping sickness, Chagas disease), <i>Leishmania</i> spp. (leishmaniasis), <i>Giardia</i> spp. (giardiasis). Symptoms, diagnosis, and treatment.
UNIT-IV Diagnosis and Control:	4.1: Microscopic examination
	4.2: Molecular techniques (PCR, sequencing)
	4.3: Serological test, Imaging modalities (ultrasound, radiography)
	4.4: Control strategies (vector control, chemotherapy, vaccines)



Reference Books

1. Veterinary Protozoology -Kreier.
2. Molecular Detection of Human Parasitic Pathogens-Liu
3. Text book of Clinical Parasitology - Belding
4. Parasitology: Protozoology and Helminthology - K. D. C
5. Introduction to Parasitology - Chandler and Read
6. Parasitology: the biology of animal parasites - Noble and N

DSC-11: Medical and Veterinary Helminthology (Theory)

Semester: IV	Paper: Discipline Specific Course
Credit: 04	Paper Title: Medical and Veterinary Helminthology (Theory)
Instruction:4hr/Wk	Paper Code: MSZY402CCT
Int. Assessment:30	Semester Exam marks: 70
Course Objective	To study the general morphology, mode of infections, diseases, diagnosis and treatment the of infections in humans and animals caused by helminthes
CourseOutcome	Studying the morphological characteristics of different helminth species, helps in their identification and classification. However, the study determines how helminth infections cause disease and the clinical manifestations associated with different species helps in diagnosing and treating infections in humans and animals.
UNIT-I Introduction to Helminthology:	1.1 Introduction, brief history, and scope of helminthology
	1.2:Classification,general morphology and anatomy of helminths
	1.3:Host-parasite interactions; Modes of transmission in humans and animals
	1.4:Factors influencing transmission dynamics
UNIT-II Medical Helminthology:	2.1:Biology and lifecycle of major human parasitic helminths: Nematodes (roundworms) <i>Ascaris</i> , <i>Dracunculus</i> , <i>Enterobius</i> , <i>Trichnella</i> , and <i>Wucheria</i>
	2.2:Trematodes (flukes) <i>Faciola</i> , <i>Polystoma</i> , <i>Diplozoon</i> ,and <i>Gyrodactylus</i>
	2.3:Cestodes (tapeworms) <i>Pseudophyllidea</i> and <i>Cyclophyllidea</i>
	2.4:Epidemiology, clinical manifestations, diagnosis, and treatment of common human helminth infections
UNIT-III Disease and Diagnostic Techniques:	3.1:Diseases caused by human parasitic helminths
	3.2:Molecular techniques (PCR) for parasite DNA detection
	3.3:Serological assays
	3.4:Imaging and Microscopic techniques
UNIT-IV Treatment and Control Strategies:	4.1:Chemotherapy for helminth infections
	4.2:Drug resistance in helminths anddrug therapy
	4.3:Vector control, and environmental management
	4.4:Integrated Parasite Management (IPM)

Reference Books

1. Clinical Parasitology by Belding
2. Medical Helminthology by Watson
3. Human Helminthology by Faust
4. General Parasitology by Cheng
5. Foundation of Parasitology by Schmidt and Roberts
6. Principles of Parasitology by Smyth
7. Parasitology by Chatterjee

DSC-12: Animal Biotechnology (Theory)

Semester: IV	Paper: Discipline Specific Course
Credit: 04	Paper Title: Animal Biotechnology(Theory)
Instruction: 4hr/Wk	Paper Code: MSZY403CCT
Int. Assessment: 30	Semester Exam marks: 70
Course Objective	To inculcate the sound knowledge in developments of science and technology in our daily life through recombinant technology.
Course Outcome	The students will be able to understand the technologies applied in production of hybrids and what are their applications in human welfare. They will be able to develop professional skills and will play a leading role in industry and research.
UNIT-I Introductory biotechnology	1.1:Introduction and brief history of biotechnology, Importance of biotechnology in Human health, Aquaculture, Immunology, Assisted Reproductive Technology, Metabolite Productions etc; Chemical integration and endocrine regulation of homeostasis
	1.2:Biotechnology approaches to vaccine and growth hormone production, usefulness of cell cultures in veterinary science
	1.3:Production of monoclonal antibodies-hybridomatechnology, Production of pharmaceuticals and biomolecules
	1.4: Fermentation technology (downstream processing) and applications of fermentation, solid-state fermentation and uses.
UNIT-II Stem cell Biology	2.1: Introduction –Definition and basic properties of Stem cells (Self renewal, Plasticity), Types of stem cells - Embryonic (Pleuripotent) and Adult Stem Cells (Multipotent, Oligopotent, Unipotent), differentiation, de-Differentiation (iPS) and trans-differentiation, molecular signalling.
	2.2:Isolation, culturing and characterization of Embryonic and Adult stem cells, Cancer stem cells, Regenerative medicine and drug testing
	2.3: Generation of Chimeric (Aggregation and injection methods) and knock-out animals.
	2.4: Cellular reprogramming for the conservation of endangered species (IVG), domestic animals and disease models.
UNIT-III Gene Cloning	3.1:Introduction, Cloning vectors: Plasmids, Yeast, Bacteriophages as vector, Replacement vectors (Cosmids, Phagemids, Lambda Bacteriophage etc
	3.2:Cloning strategies (Preparation of DNA fragments, Restriction enzyme digestion, Ligation of DNA, somatic cell cloning and hybridization, transfection and transformation of cells, commercial scale production of animal cells
	3.3:Transformation, identification and analysis of recombinants, difference between transformants and recombinants
	3.4:Expression of cloned gene in vectors and animal cells, gene expression examples, application of genetic engineering
UNIT-IV Reproduction technology	4.1:Introduction- Conventional methods of animal breeding and limitations.Assisted reproductive technology: Artificial Insemination (AI), In vitro Fertilization (IVF), Intra Cytoplasmic sperm Injection (ICSI), Sex selection.
	4.2: Embryo Transfer techniques: In vivo and in vitro embryo transfer, Multi ovulation Embryo Transfer (MOET), Embryo collection strategy,



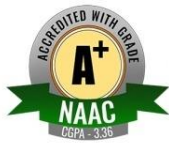
	cryopreservation of embryo, recipient selection, transfers of embryo.
	4.3: Embryo culture and Micromanipulation- Embryo culture conditions, embryo splitting and nuclear transfer for Reproductive cloning (SCNT).
	4.4: Transgenics for the Improvement of live stocks, Molecular pharming, models for human diseases and Anti-fertility animal vaccines.

Recommended Readings:

- Ramadas P. (2017). Animal Biotechnology: Recent Concepts and Developments. MJP Publishers –Chennai 600005
- Glick, B.R. and Pasternak, J.J. (2009). Molecular Biotechnology - Principles and Applications of Recombinant DNA. IV Edition, ASM press, Washington, USA.
- Brown, T.A. (1998). Molecular Biology Labfax II: Gene Cloning and DNA Analysis. II Edition, Academic Press, California, USA.
- Gordon I. 2005. Reproductive Techniques in Farm Animals.CABI.
- Levine MM, Kaper JB, Rappuoli R, Liu MA, Good MF. 2004. New Generation Vaccines. 3rd Ed. Informa Healthcare
- Portner R. 2007. Animal Cell Biotechnology. Humana Press.
- Animal Models for the Study of Human Disease, Second Edition, Editors P. Michael Conn (2017)
- Hand Book of stem cells Robert Lanza
- Essentials of stem cell biology-Robert Lanza
- Adult stem cells KursadTurksen
- Stem cells C.S.Potten

GE-2: Wild Life and Conservation Biology (Theory)

Semester: IV	Paper: Generic Elective (Theory)-GE-II
Credit: 04	Paper Wild Life and Conservation Biology (Theory)
Instruction: 4hr/Wk	Paper Code: MSZY403GET
Int. Assessment: 30	Semester Exam marks: 70
Course Objective	Wildlife Science focuses on the biology and management of wild animals, including their ecology and conservation. As a wildlife scientist one will study native and exotic birds, mammals, reptiles and amphibians in natural or created environments, their biodiversity and human-wildlife interactions, and to evaluate wildlife management programs for captive and free-ranging wildlife
Course Outcome	Knowledge of wildlife conservation, and a critical understanding of concepts such as sustainability and sustainable development. An understanding of the construction and analysis of data sets for different purposes.
UNIT-I Basic concepts of wildlife	1.1: Definition and basic concepts of wildlife, Scope of wildlife, importance of wildlife,
	1.2: Values of wildlife: Positive values (recreational, aesthetic, educational, scientific, ecological, utilitarian, commercial, cultural and game value)
	1.3: Values of wildlife: Negative values (accidents, life stock and crop damage, disease reservoirs)
	1.4: Measurement and attitude survey of wildlife values.
UNIT-II Ecological basis of wildlife management	2.1: Ecological basis of wildlife management: concept of carrying capacity, home range and territory, Management of rangelands (Types of rangeland, Characteristics, Rangeland carrying capacity, Forests and wildlife corridors, rangeland conditions).
	2.2: Biological basis of Wildlife Management : Density (Absolute, subsistence, Optimum, security, Tolerance), Saturation point, Migration, Dispersion (Emigration, Immigration), Natality, Fertility and Fecundity, Gregariousness and Flocking, Shootable Surplus, Mortality
	2.3: Decimating factors (Wildlife diseases, adverse climate, accidents, poisoning, human interference, Illegal hunting, stress, starvation, movement).
	2.4: Conservation Schemes: Project Tiger (Initiation, Finance, Objective, Management, Status, Threats), Gir Lion Sanctuary Project (Threats, Management, Work plan and achievements), Crocodile Breeding Project (Causes of depletion, Work Plan, achievement)
UNIT-III Biodiversity fundamentals	3.1: Biodiversity fundamentals: Biodiversity concepts (Species diversity, Genetic diversity and Ecosystem biodiversity), biodiversity hot spots, biodiversity of the Western & Eastern Ghats of India.
	3.2: Biodiversity assessment and status: Sources of information, Fossil record, molecular evidences,
	3.3: Biological diversity and dominance, concept of ecological indices and relationship between diversity indices, dominance and system stability (Shannon diversity index, Simpson's index, Lincoln index)
	3.4: Application of diversity indices for biological monitoring. Applications of molecular markers (DNA Fingerprinting, ISSR, DAMD, SSR) for biodiversity studies



UNIT-IV Biodiversity management and threats	4.1: Biodiversity management and threats: Introduction, Biodiversity legislation and convention, International Biodiversity laws, Convention on Biological diversity, Ramsar convention,
	4.2: Types of ex situ & in situ conservation, Role of protected areas, Trans-boundary issues, role of zoos, Biodiversity parks, gene banks, tissue culture, aquariums and botanic gardens
	4.3: Factors causing loss of diversity, habitat loss and fragmentation, introduction of alien and invasive species, disturbance and pollution, harvesting and over exploitation,
	4.4: Demographic bottlenecks, threats to marine biodiversity.

References Books:

1. Biodiversity (Academic Press). By E. O. Wilson.
2. The Diversity of Life (The College, W.W. Northem & Co) by E.O. Wilson.
3. Elephants in Similipal: History, status, issues, techniques and biological notes on elephants, by S.S. Srivastava and L.A.K. Singh.
4. Diversity by Maguran.; The biology of biodiversity (Springer). By M. Kato.
5. Wilson, E.O (1992). The Diversity of life. The Belknap Press of Harvard Univ. Cambridge.
6. Odum E.P. (1971). Fundamentals of Ecology, Sounders.