PRATAP COLLEGE AMALNER

AFFILATED TO

KAVAYITRI BAHINABAI CHAUDHARI

NORTH MAHARASHTRA UNIVERSITY, JALGAON

Faculty: Science and Technology

Semester wise Code structure and Syllabus for

Bachelor of Science

(Honours and Honours with Research)

S.Y.B.Sc. Zoology

As per NEP 2020 for Affiliated Colleges

With Effect from June 2025

ProgramataGlance

Name of the program(Degree)	**:** B. Sc.
Subject	**:** Zoology
Faculty	**:** Science and Technology
Duration of the Program	**:** Three years (four semesters)/Four years (six semesters)
Medium of Instruction and Examination	**:** English
Credits of the program	**:** Total 176 credits
Examination Pattern	**:** The 30: 20 (30 marks University assessment (exam) and20marks continuous internal college assessment (exam)
Evaluation mode	**:** CGPA
Passing standards	**:**The 40%ineachexamseparately(separate head of passing)
Result	**:**As per the University's rules of CGPA system

1. Introduction to Program in B.Sc.(Hons. /Hons. With Research) Zoology

Welcome to the Graduate Program in Zoology! Our program offers an exciting and comprehensive curriculum designed to equip students with the knowledge, skills, and practical experience necessary to understand and contribute to the fascinating field of zoology.Zoology encompasses the study of animal life in all its diversity, from microscopic organisms to complex vertebrates.

As a graduate student in Zoology, you will have the opportunity to delve deep into the intricacies of animal biology, behavior, evolution, and ecology. Our program emphasizes a multidisciplinary approach, combining the oretical knowledge with hands-on experiences in the field and laboratory settings. You will have access to state-of-the-art facilities, research opportunities, and a dedicated faculty who are passionate about sharing their expertise and mentoring the next generation of zoologists.

Throughout your journey in our program, you will develop a strong foundation in core zoological concepts. You will explore topics such as taxonomy, physiology, anatomy, evolution, animal behavior, and ecological interactions. You will also gain a comprehensive understanding of the principles and methodologies employed in the study of animals,including data collection, analysis, and interpretation.

Field work and practical experiences are integral to our program.You will have the opportunity to engage in field expeditions, ecological surveys, and hands-on research projects. These experiences will allow you to observe and study animals in the natural habitats, contributing to our understanding of biodiversity, conservation, and the ecological dynamics of various ecosystems.

Communication and critical thinking skills are emphasized throughout the program. You will learn to effectively communicate scientific concepts, both in written and verbal forms, and present your research findings to diverse audiences. We also encourage collaboration and interdisciplinary approaches, as zoology intersects with numerous other scientific disciplines, including genetics, ecology, physiology, and conservation biology.

Our program is designed to prepare you for a wide range of career paths. Whether you aspire to pursue further studies, conduct cutting-edge research, or work in fields such as wildlife management, conservation, education, or science communication, the Graduate Program in Zoology will provide you with the necessary skills and knowledge to succeed. You will also develop a deep appreciation for the ethical considerations associated with studying and working with animals and contribute to the responsible stewardship of our natural world.

We are excited to have you join our vibrant and dynamic community of zoologists. Together, we will explore the wonders of the animal kingdom, push the boundaries of scientific knowledge, and make meaningful contributions to the field of zoology. Get ready for an enriching and transformative journey in the Graduate Program in Zoology!

UG Department of ZOOLOGY-Programme Outcomes (PO)

PONo.	On completion of B.Sc. Degree programme, the graduates will be able to
PO-1	Thorough knowledge and understanding of the theories, models, concepts and Principles of zoology and related zoological applications.
PO-2	Recognize the relationship between parts of different species, our physical, biological And cultural environment.
PO-3	Gain an understanding of the evolutionary history and key characteristics of animal groups.
PO-4	Understanding and critical analysis of population processes, dynamics and interactions, And related models.
PO-5	Comprehend the ecosystem ,biogeography, diversity, and correlation with climatic, paleo-historic and evolutionary factors.

Programme Specific Outcomes (PSO)

PSONo.	On completion of B.Sc. Zoology Degree Programme, the graduates will be able to:	Mapping
PSO-1	To know the basic principles of zoology. Recognition, the relationship Between structure and function, and biological organization of animals.	PO-2
PSO-2	Analyze animal theory, classification, form and function, and evolution, And compare the structures of prokaryotes and eukaryotes.	PO-3
PSO-3	Understand the diversity of animals with taxonomy and the classification Of animals with diagnostic features.	PO-2
PSO-4	Apply knowledge and understanding of conservation and restoration Biodiversity, ecological integrity, and health.	PO-5
PSO-5	To understand practical biological sciences such as sericulture, Fish farming and beekeeping	PO-1
PSO-6	Collect ,record and analyzed at a using relevant environmental, genetic, Physiological methods in the field and in the laboratory.	PO-3
PSO-7	Effectively use information technology systems to analyze and interpret Review of information and evidence.	PO-3
PSO-8	Develop writing skills required in this program; publish research papers, Oral presentations and conference posters.	PO-1
PSO-9	Describe the molecular and cellular basis of animal physiological Functions.	PO-3
PSO-10	Provide innovative skills which will enable the knowledge and skills Required for employment.	PO-2
PSO-11	Perform practical skills in the areas of basic and applied zoology	PO-1

- **Curriculum in subjects has to follow these Model Program Structures. The Terminology used in these Program Structures is as under;**
  - **Major DSC (Mandatory)**: is the subject that represents the main focus of the degree, and the degree will be awarded in that Subject. Students should secure a minimum 50% of total credits through Major (core) Courses (mandatory courses, electives, vocational courses, Internship/ Field Projects/ Apprenticeship/ Community Engagement Projects, Seminars,andGroupDiscussion.Inaddition,Entrepreneurship,IPRandResearchProject shall be offered in case of Honors with Research Degree) in Three /Four Years for the award of Major Degree.
  - **Major Specific IKS (Cr-2)** is included under Major.
  - **Minor**: is the subject that may complement the Major subject or can have interdisciplinary band width. Minor subject may be related or unrelated to the Major subject. The Minor subjects may be from the different disciplines of the same faculty of DSC Major (Core) or they can be from different faculty altogether.
  - **GE/OE**: is to be chosen compulsorily from faculty other than that of the Major and from the faculty-wise baskets of **OE** prepared by University/Colleges.
  - **SEC** (Skill Enhancement Courses) to be selected from the basket of **Skill Courses** approved by the University.
  - **VC (**Vocational Skill Courses**)**: including **Hands on Training** corresponding to the Major and/or Minor Subject, to be selected from the basket. Wherever applicable vocational courses will include skills based on advanced laboratory practical of Major.
  - **AEC**(Ability Enhancement Courses): **a)**English:04Credits ,**b)**Modern Indian Language (MIL):04 credits,
  - **VEC** (Value Education Courses)**:** to be chosen from the courses, such as; Understanding India, Environmental Science/ Education ,and Digital and Technological Solutions,
  - **IKS (**Indian Knowledge System)**:** Courses on IKS to be selected from the basket of IKS courses approved by the University.
  - **CC:** (Co-curricular Courses): to be chosen from the courses, such as; Health and Wellness, Sports and Yoga, Environmental Awareness, Constitution of India, Cyber Security, Human Rights and Environment Law, Communication Skills and Personality Development, Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts. (Activities/Theory/ Practical/Assignment).
  - **FP/CEP**: Field Projects/Community Engagement and Service corresponding to the Major (Core) Subject. Pedagogy involves L + T + P model .The subjects with practical involve L + P ,while the subjects without practical involve L+T model. The numbers in parentheses indicate credits allotted to various courses /papers as per definitions of Choice Based Credit System (CBCS). One hour of Lecture and 2hours of practical per week in a semester is assigned one credit.The core subject theory courses/papers and practical have 2 or 4 credits.

Subject prerequisite: To study ZOOLOGY at the bachelor's level, a student must pass Biology or any other equivalent subject in class 12th.

Medium of instruction

The medium of instruction and examination for each course shall be English.

Credit to contact hour

One credit is equivalent to15periods of 60minutes each for a theory course lecture.One credit is equivalent to 30 periods of 60 minutes each for a practical course.

Attendance

The student enrolled for B.Sc. Zoology must have 75% attendance in each course in order to appear for term-end examinations, otherwise, the candidate may not be allowed to appear for term end examination as per ordinance.

Creditdistributionstructureforthree/fouryearHonors/HonorswithResearchDegreeProgrammewithMultipleEntryand Exit

Year (Level)	Sem.	Faculty	Subject-I (M-1)	Subject-II (M-2)	Subject-III (M-3)	Open Elective (OE)	VC, SEC (VSEC)	AEC,VEC,IKS	CC,FP, CEP, OJT, RP	Min. Creditsfor the Year (Sem)	Degree.
1 (4.5)	Sem-I	Science	DSC-1(2T) DSC-2(2P)	DSC-1(2T) DSC-2(2P)	DSC-1(2T) DSC-2(2P)	OE-1(2T)	----	AEC-1(2)(Eng) VEC-1(2) (EA) IKS(2)	CC-1(2)	44 (22+22)	UG Certificate In Faculty
	Sem-II	Science	DSC-3(2T) DSC-4(2P)	DSC-3(2T) DSC-4(2P)	DSC-3(2T) DSC-4(2P)	OE-2(4T)	----	AEC-2(2)(Eng) VEC-2(2)(CI)	CC-2(2)		
	Credit:1stYear		08	08	08	06	---	10	4	44	

Note:

T:TheoryCourse,**P**:Practical course, **Number in bracket indicate credit allotted. The courses which do not have practical, 'P'will be treated as'T'**

If student select subject other than faculty in the subjects M-1,M-2,andM-3,then that subject will be treated as Minor subject, and cannot be selected as Major at Second year.

- **Co-curricular Course(CC):CC-1:CC-120:Sports and Yoga and CC-2:CC-130:Cyber Security**
- **Ability Enhancement Courses (AEC):AEC-1:EG:101–English-1andAEC-2:EG:102–English-2**
- **Value Education Courses(VEC):VEC1:ES-118:Environmental Science and VEC2:CI-129:Constitution of India**
- **Indian Knowledge System (IKS):IK:119:Ayurvedic Medicine in Ancient India**

T: Theory Course P:Practical course
DSC: Discipline Specific Core Course
DSE:Discipline Specific Elective Course
MIN: Minor subject
VSEC:Vocational skill and Skill enhancement courses
VC: Vocational Skill Courses
SEC:Skill Enhancement Courses
GE/OE: Generic/Open elective
CI: Constitution of India
AEC: Ability Enhancement Courses
VEC:ValueEducationCourses
IKS:IndianKnowledgeSystem
CC: Co-curricular course
CEP:Community engagement and service
OJT:On Job Training: Internship/Apprenticeship
RP:Research Project
RM:Research methodology
EA:Environment Awareness ENG: English
MIL:Modern Indian language

NEP 2020 Structure and Credit Distributions with Selection of Major at SecondYear

B.Sc (Honours/Honours Research)– Second year

Year (Level)	Sem.	Faculty	Subject-I (M-1) Major		Subject-II (M-2) Minor	Subject-III (M-3)	Open Elective (OE)	VC, SEC (VSEC)	AEC, VEC, IKS	CC,FP, CEP, OJT, RP	Min. Credits for the Year (Sem)	Degree.
			Mandatory DSC	Elective DSE	MIN							
			Student must choose one subjectasa Majorsubject outofM-1,M-2,M-3that He/ShehaschosenatFirst Year.		Studentmustchoose one subject as a Minor subject outofM-1,M-2,M- 3 that He/She has chosen at First Year. (Minor must be otherthanMajor)							
2 (5.0)	Sem-III	Science	DSC-5(2T) DSC-6(2T) (IKS) DSC-7(2P)	---	MIN-1(2T) MIN-2(2T) MIN-3(2P)	---	OE-3 (2T)	SEC-1(2T) SEC-2(2P)	AEC-3(2) (MIL)	CC-3(2)	44 (22+22)	UG Diploma In Faculty
	Sem-IV	Science	DSC-8(2T) DSC-9(2P)	---	MIN-4(2T) MIN-5(2P)	---	OE-4 (2T)	VC-1(2T) VC-2(2P)	AEC-4(2) (MIL)	CC-4(2) and *OJT / Int.(4)		
	Credit:2nd Year		10	---	10	---	04	08	4	08	44	

***OJT/Internship should be completed in the summer vacation after 4th semester.**

CC-3:CC-220:Human Rights and Environment Law and CC-4:CC-229: Communication Skills and Personality Development AEC-3: MR: 201 – Marathi -1; AEC-3: HN: 201 – Hindi -1; AEC-3: MR: 202 – Marathi -2 and AEC-3: HN: 202 – Hindi -2

NEP2020 Structure and Credit Distributions with Selection of Major at Third Year

B.Sc (Honors/Honours Research)– Third year

Year (Level)	Sem.	Faculty	Subject-I (M-1) Major		Subject-II (M-2) Minor	Subject-III (M-3)	Open Elective (OE)	VC, SEC (VSEC)	AEC, VEC, IKS	CC,FP, CEP, OJT, RP	Min. Creditsfor the Year (Sem)	Degree.
			Mandatory DSC	Elective DSE								
3 (5.5)	Sem-V	Science	DSC-10(2T) DSC-11(2T) DSC-12(2T) DSC-13(2T) DSC-14(2T) DSC-15(2P) DSC-16 (2P)	DSE-1(2T) DSE-2(2P)	----	---	---	SEC-3 (2T)	----	FP-1(2)	44 (22+22)	UG Degree
	Sem-VI	Science	DSC-17(2T) DSC-18(2T) DSC-19(2T) DSC-20(2T) DSC-21(2P) DSC-22 (2P)	DSE-3(2T) DSE-4(2P)	----	---	----	VC-3(2T) VC-4(2P)	----	FP-2(2)		
	Credit:3rd Year		26	08	00	00	00	06	00	04	44	
	Cum.Cr.of3Years		44	08	18	08	10	14	14	16	132	132

FP: Field Project should be completed in respective semester.

Question Paper Pattern for 2 Credit Course

Subject

Total Pages:02

Time:One and half Hours **Max.Marks:30**

Instruction to Candidates:

1. Do not write anything on question paper except Seat No.
2. All questions are compulsory.
3. Figures to right indicate full marks.
4. Students should note, no supplement will be provided.
5. Graph or diagram should be drawn with the black ink pen or black HB pencil.

1.	**A**	Multiple Choice questions	**06**
	i)		
	ii)		
	iii)		
	iv)		
	v)		
	vi)		
2.		Attempt **any three** of the following.	**06**
	i)		
	ii)		
	iii)		
	iv)		
3		Attempt **any two** of the following.	**06**
	i)		
	ii)		
	iii)		
4.	**A**	Attempt **any one** of the following.	**04**
	i)		
	ii)		
4.	**B**	Compulsory question.	**02**
	(i)		
5.		Attempt **any one** of the following	**06**
	i)		
	ii)		

*****

Semester-wise Code structure for B.Sc(Honors/Research) Programme as per NEP2020,forAffiliated Colleges w.e.f–June 2025.											
B.Sc (Honors/Research)–SecondYear, SEMESTER–III, Level–5.0											
Course	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Teaching Hours/ Week**			**Marks(Total100)**			
					T	**P**	**Total**	**Internal (CA)**		**External (UA)**	
								T	**P**	**T**	**P**
DSC-5	DSC	ZOO-MJ-231	Parasitology	2	2	--	2	20	--	30	--
DSC-6	DSC	ZOO-MJ-IKS232	Ethnozoology	2	2	--	2	20	--	30	--
DSC-7	DSC	ZOOMJP-233	Practicals of Parasitology and Ethnozoology	2	--	4	4	--	20	--	30
MIN-1	MIN	ZOOMN-236A	Animal Type-Grasshopper	2	2	--	2	20	--	30	--
MIN-2	MIN	ZOOMN-236B	Ecology	2	2	--	2	20	--	30	--
MIN-3	MIN	ZOOMNP-236	Practicals of Animal Type–Grasshopper And Ecology	2	--	4	4	--	20	--	30
OE-3	OE	ZOO-OE-237	Ornamental Fish Culture	2	2	--	2	20	--	30	--
SEC-1	SEC	ZOOSEC-234	Pearl Culture Techniques	2	2	--	2	20	--	30	--
SEC-2	SEC	ZOOSECP-235	Practicals of Pearl Culture Techniques	2	--	4	4	--	20	--	30
CC-3	CC	CC-220	Human Rights and Environmental Laws	2	2	--	2	50	--	--	--
AEC-3	AEC	MR-201	Marathi-1	2	2	--	2	20	--	30	--
		HN-201	Hindi-1	2	2	--	2	20	--	30	--
B.Sc(Honors/Research)–SecondYear,SEMESTER–IV,Level–5.0											
DSC-8	DSC	ZOOMJ-241	Agricultural Pest management	2	2	--	2	20	--	30	--
DSC-9	DSC	ZOOMJP-243	Practicals of Agricultural And Pest management	2	--	4	4	--	20	--	30
MIN-4	MIN	ZOOMN-246A	Animal Type–*Labeo rohita*	2	2	--	2	20	--	30	--
MIN-5	MIN	ZOOMNP-246B	Practicals of Animal Type-*Labeo rohita*	2	--	4	4	--	20	--	30
OE-4	OE	ZOO-OE-247	Sericulture	2	2	--	2	20	--	30	--
VC-1	VSC	ZOOVC-244	Economic Zoology	2	2	--	2	20	--	30	--
VC-2	VSC	ZOOVCP-245	Practicals of Economic Zoology	2	--	4	4	--	20	--	30
OJT/ Int.	OJT/ Int.	ZOO-242	OJT/ Int. corresponding to the Major (Core) Subject: *e.g.* Approaches to Animal diversity conservation	4	--	8	8	--	40	--	60

CC-4	CC	CC-229	Communication Skills and Personality Development	2	2	--	2	50	--	--	--
AEC-4	AEC	MR-202	Marathi-2	2	2	--	2	20	--	30	--
		HN-202	Hindi-2	2	2	--	2	20	--	30	--
Cumulative Credits for Second Year–44											

SEMESTERIII

CourseTitle/Code: **DSC-5 Parasitology**	
Course Code:**ZOO-MJ-231**	Course Credits: **2**-L-T-Pper week:**2-0-0**
Total Contact Hours**:30**	Duration of Lecture: **1Hour**
College Assessment(CA)Marks:**20**	University Assessment(UA)Marks:**30**

Course Objectives

- Students will able Explain the fundamental concepts of parasitology, including types of parasites, host-parasite relationships, and modes of transmission.
- Recognize important protozoan parasites, and describe their life cycles, morphology, and adaptations.
- Students will know the important helminth parasites,and describe their life cycles, morphology, and adaptations.
- Recognize important arthropod parasites, and describe their life cycles, morphology, and adaptations.
- Examine the impact of parasitic infections on host physiology, immunity, and disease transmission dynamics.
- Learn about diagnostic techniques, treatment options, and strategies for the prevention and control of parasitic diseases.

DSC-5 ZOO MJ-231 Parasitology

Unit	Topic	Hours	Marks
I	General Concepts in Parasitology • Introduction to Parasitology, Definitions of Parasites, host, Vector, Zoonosis • Types of parasites- Ectoparasites, Endoparasite and their subtypes • Basic concept of Parasitism, Symbiosis, commensalisms and mutualism • Types of hosts: Intermediate and Definitive, Accidental and Reservoir hosts	**06**	**11**
II	Protozoan Parasites • Study of morphology ,life cycle, pathogenicity, and control measures of following • *Entamoeba histolytica* • *Plasmodium vivax*	**06**	**11**
III	Helminthes Parasites • Study of morphology ,life cycle, pathogenicity, and control measures of following • *Taenia solium* • *Fasciola hepatica* • *Wuchereria bancrofti*	**09**	**14**
IV	Parasitic Arthropods • Study of morphology, life cycle, pathogenicity, and control measures of following • Ticks(Soft tick *Ornithodoros*, Hardtick *Ixodes*) • Mites(*Sarcoptes scabiei*) • Lice (*Pediculus humanus*)	**09**	**14**

ReferenceBooks

- Arora,D.R andArora,B.(2001)MedicalParasitology. IIEdition.CBSPublications.
- E.R.NobleandG.A.Noble(1982)Parasitology:Thebiologyofanimalparasites.V Edition.
- Ahmed,N.,Dawson,M.,Smith,C.andWood,Ed.(2007)BiologyofDisease.Taylor and Francis Group.
- Parija,S.C.Textbookofmedicalparasitology,protozoology&helminthology(Text and colour Atlas),
- IIEdition,AllIndiaPublishers&Distributers,MedicalBooksPublishers,Chennai, Delhi.
- Meyer,Olsen&Schmidt'sEssentialsofParasitology,Murray,D.Dailey,W.C. Brown Publishers.
- K.D.Chatterjee(2009).Parasitology:ProtozoologyandHelminthology.XIIIEdition, CBSnP.
- Gunn,A.andPitt,S.J.(2012).Parasitology:AnIntegratedApproach.Wiley Blackwell.
- Noble,E.R.andG.A.Noble(1982)Parasitology:Thebiologyofanimalparasites.V th Edition, Lea &Febiger.
- Paniker,C.K.J.,Ghosh,S.[Ed}(2013).Paniker'sTextBookofMedicalParasitology. Jaypee, New Delhi.

Course Outcomes

CO No.	Upon complete on of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall fundamental concepts of parasitology ,including parasite types, host classifications, and host-parasite interactions.	9, 11	Remembering	01
CO-2	Explain the basic principles of parasitism, symbiosis, commensalism, mutualism, and their significance in biological systems.	9	Understanding	02
CO-3	Applyknowledge to classify parasites (ecto-,endo-,intermediate, definitive, and reservoir) and identify their roles indisease transmission.	1, 9	Applying	03
CO-4	Analyze the morphology, life cycle, pathogenicity, and control measures of medically important parasites and Parasitic arthropods.	6	Analyzing	04
CO-5	Evaluate diagnostic techniques and control strategies for managing parasitic infections in humans and animals.	11	Evaluating	05
CO-6	Develop innovative parasite control measures and propose integrated strategies for sustainable parasitic Disease management.	9	Creating	06

CourseTitle/Code: **DSC-6 Ethnozoology**	
CourseCode: **ZOO MJ IKS-232**	CourseCredits:**2**-L-T-Pperweek:**2-0-0**
TotalContactHours**:30**	DurationofLecture:**1Hour**
CollegeAssessment(CA)Marks:**20**	UniversityAssessment(UA)Marks:**30**

Course Objectives:

- Explain the historical background, origin, and significance of ethnozoology in human societies.
- Describetheroleofanimalsin Indiantraditions,includingmyths,symbols,andsacred beliefs.
- Examinethemedicinalusesofanimal-derivedproductsintraditionalandmodern healthcare.
- Assesstheimpactofethnozoologicalpracticesonbiodiversityconservationandsustainab le resource utilization.

DSC-6DSC ZOO-IKS-232Ethnozoology

Unit	Topic	Hours	Marks
I	**Basics of Ethnozoology** • Definition and scope of Ethnozoology • Historical background and development of the discipline • Importance in under standing human- animal relationships	**8**	**13**
II	**Traditional Animal Knowledge and Practices** • Indigenous knowledge of animals and their uses • Domestication and management of animals in traditional societies • Medicinal and ritualistic uses of Honey bee products, Lac, Silk, Vermicompost, • Folklore, myths, and legends related to Rohu, Frog, Cobra, Crow and Cow • Ethnozoological practices in hunting and fishing	**7**	**12**
III	**Human-Animal Relationships and Conservation** • The role of animals in cultural identity and symbolism • Impact of human activities on animal populations (hunting, habitat destruction) • Conservation ethics and sustainable practices in ethnozoology	**7**	**12**
IV	**Applied Ethnozoology and Future Directions** • Modern applications in agriculture, medicine, food, Decoration, Traction and Transport • Animals as indicator of Weather and Climate– Pavashya, Nest of birds, Ants • Contemporary issues and challenges in Ethnozoology • Future trends and interdisciplinary approaches	**8**	**13**

Reference books

- Goswamy,B. N. (2017).*Indian Art:Animals in Indian Art*. Roli Books.
- Gandhi,M.(2015).*Animals in Indian Mythology*.Harper CollinsIndia.
- Pattanaik,D.(2006). *Myth=Mithya: Decoding Hindu Mythology*. Penguin India.

- Cort, J. E. (2000). *Animals inIndian Literature and Tradition*. Oxford University Press.
- Harle,J.(1990).*The Art and Architecture of Indian Temples*. Cambridge University Press.
- Joy, K.P.(2005).*Sacred Invertebrates: A Cultural Perspective*. Sarup & Sons.
- Reade,E.G.(2011).*Mythical Creatures and Real-Life Invertebrates in Indian Lore*. Routledge India.
- Doniger,W.(2009).*The Hindus: An Alternative History*. Penguin Books.
- Shastri,A.M.(1996).*The Ocean in Indian Mythology:Fish and Amphibians*. Motilal Banarsidass.
- Rosen,S.J.(2004).*HolyCow: The Hare Krishna Contribution to Vegetarianism and Animal Rights*. Lantern Books.
- Krishna, N.(2010).*Sacred Animals of India*.Penguin Books.
- Kramrisch,S. (1981). *The Presence of Shiva*. Princeton University Press.
- Sainudeen Pattazhy, An Introduction to Ethnozoology, Lambert Academic Publishing
- Romulo Romeu Nobrega Alves ,Ulysses Paulino Albuquerque, Ethnozoology: Animalsin Our Lives, Academic Press, 2017, ISBN0128099143, 9780128099148

Course Outcomes

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the fundamental concepts, history, and significance of ethnozoology.	9, 11	Remembering	01
CO-2	Explain the cultural and religious significance of animals in Indian traditions, including myths, vahanas, and sacred symbols.	9	Understanding	02
CO-3	Apply knowledge to identify and categorize various zoo-therapeutic practices and their applications in traditional medicine.	1, 9	Applying	03
CO-4	Analyze the role of animals in historical and modern contexts, including their representation on flags, pillars, and religious texts.	6	Analyzing	04
CO-5	Evaluate the ethical, ecological, and conservation –related concerns associated with ethno-zoological practices.	11	Evaluating	05
CO-6	Develop sustainable and culturally sensitive approaches for integrating traditional animal-based knowledge With modern conservation efforts.	9	Creating	06

DSC-07 Practicals of ZOO-231 and 232 Parasitology and Ethnozoology	
CourseCode:**ZOO MJP-233**	CourseCredits:**2**-L-T-Pperweek:**0-0-4**
TotalContactHours**:60**	DurationofPractical:**4Hours**
CollegeAssessment(CA)Marks:**20**	UniversityAssessment(UA)Marks:**30**

Course Objectives

- Explainthestructuralcharacteristicsanddevelopmentalstagesofkeyprotozoan, helminthic, and arthropod parasites using permanent slides and charts.
- Examine the significance of animals in Indian traditions, including myths, religioussymbols, and sacred associations.
- Assess the impact of parasitic organisms on human and animal health, including their transmission and control.
- Conduct field visits to temples, slaughterhouses, and natural habitatsto observe thereal-world application of ethnozoological concepts and parasitology.

DSC-07 Practicals of ZOO-231 and 232 Parasitology and Ethnozoology

Practical	Title of Practical	Hours
1	Study of parasitic zoonoses: viral (Rabies) and bacterial disease (Leptospirosis)	**4**
2	Microscopic Examination of Parasite Life Stages of Protozoans : *Entamoeba histolytica, and Plasmodium vivax* with help of permanent slides/ charts	**4**
3	Study of life cycle of *Fasciola hepatica, Tania solium and Ascaris lumbricoides* with help of permanent slides/charts	**4**
4	Study of life cycle of *Anopheles* mosquitoes and *Musca domestica* with help of permanent slides/ charts	**4**
5	ELISA techniques used for diagnosis of parasitic infections	**4**
6	Demonstration of endoparasites from the fish/chick/goat/sheep intestine	**4**
7	Morphometric study of Parasitic Arthropods with help of permanent slides/pictures:Ticks(softtick*Ornithodoros*,hardtick,*Ixodes*),Mites (*Sarcoptes*), Lice (*Pediculus*)	**4**
8	Documentation of animal uses in Indian tradition	**4**
9	Study of animal species and their uses in folklore	**4**
10	Study of animals in cultural identity and symbolism	**4**
11	Study of animals in agriculture, food, decoration and Transport	**4**
12	Study of Animals/their products as medicine(any5)	**4**
13	Study of Animal conservation strategies	**4**
14	Case Study: Exploring Biodiversity and Ethnozoological Knowledge in Local Communities	**4**
15	Field work: Survey and Documentation of Ethnozoological Practices in Local Communities	**4**

ReferenceBooks:

- Goswamy,B. N. (2017).*Indian Art: Animals in IndianArt*. Roli Books.
- Gandhi,M.(2015).*Animals inIndian Mythology*.HarperCollinsIndia.
- Pattanaik,D.(2006).*Myth=Mithya:Decoding Hindu Mythology*.PenguinIndia.

- Cort,J. E. (2000).*Animals inIndian Literature and Tradition*. Oxford University Press.
- Harle,J.(1990).*TheArt and Architecture of Indian Temples*. Cambridge University Press.
- Joy,K.P.(2005).*Sacred Invertebrates: A Cultural Perspective*. Sarup&Sons.
- Reade,E.G.(2011).*Mythical Creatures and Real- Life Invertebrates in Indian Lore*. Routledge India.
- Doniger,W.(2009).*The Hindus: An Alternative History* .Penguin Books.
- Shastri,A.M.(1996).*The Ocean in Indian Mythology :Fish and Amphibians*. Motilal Banarsidass.
- Rosen,S.J.(2004).*HolyCow:The Hare Krishna Contribution to Vegetarianism and Animal Rights*. Lantern Books.
- Krishna,N.(2010).*Sacred Animals of India*.Penguin Books.
- Kramrisch,S. (1981). *The Presence of Shiva*. Princeton University Press.

CourseOutcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the morphology and life cycle of major protozoan, helminthic, and arthropod parasites Using permanent slides and charts.	9, 11	Remembering	01
CO-2	Explain the cultural and religious significance of animals in Indian traditions, including myths, vahanas, and sacred symbolism.	9	Understanding	02
CO-3	Apply knowledge to identify parasites and their pathogenic effects in medical and veterinary contexts.	1, 9	Applying	03
CO-4	Analyze the transmission, pathogenicity, and control measures of key parasites affecting Humans and animals.	6	Analyzing	04
CO-5	Evaluate the conservation and Ethical aspects of using animals in traditional and religious practices.	11	Evaluating	05
CO-6	Conduct field studies and propose sustainable approaches to integrate traditional knowledge with modern Parasitological research.	9	Creating	06

Course Category/Title:**MIN-1 Animal type-Grasshopper**	
Course code**: ZOO MN-236A**	CourseCredit**:2-**L-T-Pperweek:**2-0-0**
Total Contact Hours:30	**Duration of Lecture:1 Hour**
College Assessment(CA) Marks:20	**University Assessment(UA)Marks:30**

Course Objectives

- Explain external features, sexual dimorphism, and physiological adaptations in various environments of Grasshoppers.
- Describethe digestive, respiratory, circulatory, nervous, and excretory systems of grasshoppers and their roles in survival.
- Assess their impact on agriculture ,ecosystems, and their role in food chains.
- Understand the developmental stages and reproductive mechanisms of grasshoppers.

MIN-1:ZOO-236A-Animal type–Grasshopper

Unit	Topics	Periods	Marks
I	**Animal type–Grasshopper (*Poiekilocercuspictus*)** **A) Grasshopper biology** • Systematic position, habit& habitat • External features: Shape, size, colour, exoskeleton • Division of the body: Head ,thorax and abdomen • Locomotory organs: Legs and wings • Sexual dimorphism **B) Digestive system** • Mouth parts • Alimentary canal and Digestive glands	**07**	**12**
II	**A) Respiratory system** • Tracheal system • Types of spiracles (thoracic and abdominal) **B) Circulatory system** • Heart, aorta, sinuses • Haemolymph- Composition and functions	**08**	**13**
III	**A) Nervous system:** • Central Nervous system • Peripheral Nervous system • Sense organs: Ocelli, Compound eyes, antennae **B) Excretion in grasshopper:** • Structure of excretory organs (Malpighiantubules)	**07**	**12**
IV	**A) Reproductive system** • Male reproductive system • Female reproductive system **B)Economic importance of grasshopper**	**08**	**13**

Reference Books

- Parker J. and Haswell, W.: Text-Book of Zoology, ELBS Edition
- Vidyarthi: Text-Book of Zoology-Agrasia Publishers, Agra.
- Ruppert and Barnes, R.D.(2006).Invertebrate Zoology, VIII Edition. Holt Saunders
- InternationalEdition.
- Kotpal RL(2009):Modern textbook of Zoology Invertebrates, Rastogi Publication.

- KotpalR.L.: Arthropods
- PrasadS.N.:LifeofInvertebrates,VikasPublishinghouse,NewDelhi.
- Jorden,E.L.:TheInvertebrates,S.C.Chand,New Delhi.

CourseOutcomes (COs)

CO No.	Upon complete on of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the external features, sexual dimorphism, and physiological Adaptations of grasshoppers.	9, 11	Remembering	01
CO-2	Explain the structure and function of various organ systems, including digestion, respiration, circulation, nervous control, and excretion.	9	Understanding	02
CO-3	Apply knowledge to identify the economic significance of grasshoppers in agriculture and ecosystems.	1, 9	Applying	03
CO-4	Analyze the reproductive system and life cycle stages, including egg, nymph, and adult development.	6	Analyzing	04
CO-5	Evaluate the impact of grasshoppers on crop production and propose management Strategies for pest control.	11	Evaluating	05
CO-6	Develop insights into how grasshopper adaptations contribute to their survival and ecological success.	9	Creating	06

CourseCategory/Title: **MIN-2 Ecology**	
Course Code: ZOO MN -236B	Course Credits: **2** L-T-Pperweek**:2-0-0**
Total Contact Hours:30	**Duration of Lecture:**1Hour
College Assessment (CA) Marks:20	**University Assessment (UA) Marks:**30

Course Objectives

- Explain the structure, function, and components of different ecosystems, Including energy flow and ecological pyramids.
- Examine food chains, food webs, ecological succession, and niche dynamics.
- Assess population dynamics, life tables, and factors regulating population size.
- Understand biodiversity management, environmental pollution, and global ecological changes.

MIN–2 ZOO MN-236 B Ecology

Unit	Content	Hours	Marks
I	**Fundamentals of Ecology** • Definition, objectives and scope of ecology • Abiotic and biotic components of ecosystems • Trophic levels and energy flow (producers, consumers, decomposers) • Ecological pyramids (energy, biomass, numbers) • Food chain and Food web.	**8**	**13**
II	**Ecological succession:** • Definition, Types: Primary, SecondaryandCyclic Succession. • General process of succession • Concept of Climax	**7**	**12**
III	**PopulationEcology:** • Definition, concept of population and metapopulation • Characteristics of population: density, natality, fecundity, mortality. • Population growth: geometric, exponential, logistic, density- dependent. • Migration and regulation of population size.	**8**	**13**
IV	**Applied ecology:** • Ecological effects of pollutants (pesticides, heavy metals,plastics). • Climate change and its impacts on eco systems. • Ecological effects on environment: global warming and ozone hole, Green House Effect,	**7**	**12**

Reference books

- Turkand Turk:4th edition,Environmental science,Saunders College Publication, NewYork.
- Odum E.P.Fundamentals of Ecology,E. B.Saunders Co.
- P.D.Sharma : Ecology, Rastogi publication.
- SouthwickV.H.(1976) Ecology and the quality of environment Zedn.VanNostrant Newyork.
- SaxN.L.: Industrial pollution, Van Nastr and Reinhold Co.Newyork.

CourseOutcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the basic concepts of ecosystem structure ,energy flow, and ecological pyramids.	9, 11	Remembering	01
CO-2	Explain ecological succession, food chains, food webs, and population ecology dynamics.	9	Understanding	02
CO-3	Apply ecological principles to analyze population growth, migration, and environmental resistance.	1, 9	Applying	03
CO-4	Break down ecological interactions, including niche types, ecotones, and the edge effect.	6	Analyzing	04
CO-5	Evaluate biodiversity threats, Environmental pollution, and global ecological challenges.	11	Evaluating	05
CO-6	Propose strategies for biodiversity conservation and Sustainable ecosystem managemnt.	9	Creating	06

Course Category/ Title: **MIN-3 Practicals of Animal Type–Grasshopper and Ecology**	
Course Code: ZOO-MNP -236	Course Credits: **2** L-T-Pperweek:**0-0-4**
Total Contact Hours:30	**Duration of Lecture: 1 Hour**
College Assessment (CA) Marks:20	**University Assessment (UA)Marks:**30

Course Objectives

- Identify external features, sexual dimorphism, and major organ systems.
- Study the digestive, circulatory, nervous, and reproductive systems in detail.
- Understand the metamorphosis of grasshoppers, from egg to adult.
- Conduct estimations of oxygen, carbon dioxide, alkalinity, and hardness in freshwater samples.

ZOO-236 Course Title: Practical's of Animal Type –Grasshopper and Ecology

Sr. No.	Nameof thepractical's	Hours
1.	External characters and sexual dimorphism of Grasshopper	**4**
2.	Mounting of mouth parts, wings, legs, trachea and spiracles of Grasshopper	**4**
3.	Study of Digestive system of Grasshopper	**4**
4.	Study of Circulatory system of Grasshopper	**4**
5.	Study of Nervous system of Grasshopper	**4**
6.	Study of Male and female reproductive system of grasshopper	**4**
7.	Study of Life cycle of grasshopper	**4**
8.	Measurement the environmental factors of soil and water-Temperature, pressure, humidity, soil pH.	**4**
9.	Determination of physico- chemical properties of water O_2.	**4**
10.	Determination of physico-chemical properties of water CO_2.	**4**
11.	Determination of physico- chemical properties of water hardness.	**4**
12.	Assessment of Dust Fall Depositionon Leaves: A Bioindicator Approach	**4**
13.	To study the roadside animal species.	**4**
14.	To study the zooplankton in fresh water bodies.	**4**
15.	Field report: Visit to a forest/river/wet land ecosystem.	**4**

Referencebooks

- Trivedi R.K.,Goel P.K.,Trisal C.L.:Practical methods in Ecology and Environmental
- Science Environmental Publishers ,Karad.
- Parker J. and Haswell, W: Text-Book of Zoology, ELBS Edition ¬ Vidyarthi: Text- Book of Zoology - Agrasia Publishers, Agra.
- Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
- Kotpal RL(2009):Modern textbook of Zoology Invertebrates, Rastogi Publication.
- Kotpal R.L.: Arthropods - Prasad S.N.: Life of Invertebrates, Vikas Publishing house, New Delhi.
- Jorden,E. L.:The Invertebrates, S.C. Chand, NewDelhi.

CourseOutcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the external morphology and sexual dimorphism of grasshoppers.	9, 11	Remembering	01
CO-2	Explain the structure and function of digestive, circulatory, nervous, and reproductive systems.	9	Understanding	02
CO-3	Apply mounting techniques to Study mouthparts, wings, legs, and internal structures.	1, 9	Applying	03
CO-4	Analyze the lifecycle stages of grasshoppers and their Developmental processes.	6	Analyzing	04
CO-5	Evaluate water quality parameters such as oxygen content, carbon dioxide, Alkalinity ,and hardness.	11	Evaluating	05
CO-6	Conduct field studies to analyze Aquatic and terrestrial ecosystems.	9	Creating	06

Course Category/Title: **OE-3 Ornamental Fish Culture**	
Course Code: ZOO-OE -237	CourseCredits:**2** L-T-P per week:**2-0-0**
Total Contact Hours:30	**DurationofLecture:1 Hour**
College Assessment (CA)Marks:20	**UniversityAssessment(UA)Marks:30**

Course Objectives

- Learn about the history, importance, and essential components of an aquarium.
- Study the taxonomy, biology, and sexual dimorphism of both exotic and indigenous ornamental fishes.
- Understand brood stock management, induced breeding, and feed ingstrategies for ornamental fish.
- Learn about the symptoms, treatment, and preventive measures for diseases in aquarium fish.

OE-3 ZOO-OE-237 Ornamental Fish Culture

Unit	Topic	Hours	Marks
I	Designing and preparation of aquaria with all accessories - Importance and history of aquarium fish keeping. Design and Construction of aquaria;	**8**	**13**
II	Aquarium floor setting, Filters, Aquarium accessories, Water quality management in aquarium systems, Aquarium plants. Live bearers and egg layers. Sexual dimorphism in ornamental fishes.	**7**	**12**
III	Fresh water ornamental fishes: Common ornamental fishes- exotic species - *Molliensia sphenops* (black molly), *Poecilia reticulata* (guppy), *Carassius auratus* (red oranda). Indigenous ornamental fishes - Cyprinids : *Puntius filamentosus* (Indiantigerbarb); Loaches: *Nemacheilu striangularis* (Zodiacloach); and Catfishes : *Horabagrus brachysoma* (Yellowish catfish)	**7**	**12**
IV	Breeding and rearing of common ornamental fishes. Conditions for breeding, Brood stock management, Induced breeding, Food and feeding, Control of algal growth, snails and other predators. Common disease of ornamental aquarium fishes - symptoms, treatment and prophylactic measures.	**8**	**13**

Reference books

- Axelord, H.R.(1967). Breeding aquarium fishes, T FH Publications.
- Mills, D.(1981).Aquarium Fishes,Arco publishing.
- Mills,D .and Vevers,G.(1982).The Practical encyclopedia of freshwater ,Tropical
- Aquarium fishes, Salamander Bookslimited,London.
- Gahlawat,S.K.,et.al.(2007).Manual of experimental Ichthyology, Dayapublishing, House, Delhi.
- Brunner,G.(1973).Aquarium plants, TFH Publications, Inc.Ltd., Hongkong.
- Hansen,J.(1979).Making your own aquarium, Belland Hyman Ltd., London.
- Lovell,T.(1998).Nutrition and feeding of fish second Ed. Kluwer Academic publishers.
- Talwar,P.K.,and Jhingran,A.G.(1991).Inland fishes Oxford and IBHPublishingCo. PVT LTD, New Delhi
- Dr.ShaikhHafizMahmad,Aquarium fish keeping and maintenance ,International Publications, Kanpur.

CourseOutcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the essential components and design principles of an aquarium.	9, 11	Remembering	01
CO-2	Explain the biological characteristics and classification Of common ornamental fishes.	9	Understanding	02
CO-3	Apply techniques for setting up and maintaining a functional aquarium environment.	1, 9	Applying	03
CO-4	Analyze breeding and rearing Conditions for ornamental fishes.	6	Analyzing	04
CO-5	Evaluate water quality management practices and disease prevention strategies in aquariums.	11	Evaluating	05
CO-6	Develop sustainable breeding and maintenance plan for Ornamental fishes.	9	Creating	06

CourseCategory/ Title:**SEC-1ZOOSEC-234 Pearl Culture Techniques**	
Course Code: ZOO-SEC-234	Course Credits: **2** L-T-Pperweek:**2-0-0**
Total Contact Hours:30	**Duration of Lecture:**1Hour
College Assessment(CA)Marks:20	**University Assessment(UA)Marks:** 30

Course Objectives

- Learn about the types of pearls, pearl-producing mollusks, and major pearl farming regions in India.
- Study the chemical composition, classification, physical properties, and factors influencing pearl formation.
- Gain knowledge of mussel selection, surgical procedures, graft preparation, nucleus implantation, and harvesting methods.
- Assess the markettrends,demand,pricing,andrecentadvancementsinfresh water pearl farming in India.

SEC-1 ZOO-SEC-234 Pearl Culture Techniques

Unit	Topics	Hours	Marks
I	**Introduction to Pearl culture** • Meaning of pearl • Types of Pearls: Natural pearls and Cultured pearls • Pearl Producing Mollusks': A. Freshwater Mollusks and Marine Mollusks • Pearl farming region in India: Gulf of Mannar and Gulf of kutch.	**7**	**12**
II	**Properties of Pearls** • Chemical composition of pearl. • Classification of pearls. • Physical properties of pearl. • Pearl Formation • Uses of pearl	**8**	**13**
III	**Implantation and harvesting** • Selection of mussel; • Surgery of mussel and precautions; • Graft tissue preparation; • Nucleus implantation; and Post-surgical care and • Harvesting of pearl	**7**	**12**
IV	**Economics of pearl farming** • Marketing and the nature of the market for pearl • Incomes and prices on the demand for pearls • Recent Trends in Fresh water Pearl Farming in India • Pearl culture training institutes in India.	**8**	**13**

Reference books

- Adhikari S and Chatterjee D. K. (2008) Management of Tropical Freshwater Ponds.Daya Publ.
- Boyd,C.E.andTucker,C.S.(1992).Water Quality and Pond Soil Analysis for Aquaculture, Alabama Agricultural Experimental Station, Auburn University.

- APHA,AWWA,WPCF.(1998).Standard Methods for the Examination of Water and Wastewater, 20th Ed.
- BoydCE.(1979).Water Quality inWarm Water Fish Ponds. Auburn University.
- ICAR.(2006). Handbook of Fisheries and Aquaculture.
- TR, Maita Y and Lalli CM. (1984).A Manual of Chemical and Biological Methods for Seawater Analysis. Pergamon Press.
- Alagarswami, K., & Victor, A. C. C. (1976). *Pearl culture*. Central Marine Fisheries Research Institute.
- Boutan,L.(1925). *Laperle* (Thepearl).FélixAlcan.
- Cahn,A.R.(1949).*PearlcultureinJapan*.United States Government Printing Office.
- George, R. W., & George, J. J. (1990). *Australian pearl farming manual*. Fishing Industry Training Board of Western Australia.
- Gervis, M. H., & Sims, N. A. (1992). *The biology and culture of pearls*. WorldFish Center.
- Landman, N. H., Tanabe, K., &Shigeta, Y. (Eds.). (2001). *Cephalopods: Present and past*.Springer. (While focused on cephalopods, some chapters might touch upon pearl formation as a biological process).
- Lucas, A., & Southgate, P. C. (Eds.). (2012). *Aquaculture: Farming aquatic animals and plants*. Wiley-Blackwell. (Likely includes a comprehensive section on pearl culture).
- Southgate, P. C., & Lucas, J. S. (2008). *Aquaculture of pearl oysters* (2nd ed.). WorldFish Center. (This is a highly relevant and likely key resource).
- Strack,E.(2006).*Pearls*.Rühle-Diebener-VerlagGmbH&Co.KG.(Oftenconsidered a comprehensive gemological perspective on pearls, including cultured pearls).
- Webster, R. (2000). *Gems: Their sources, descriptions and identification* (5th ed.). Butterworth-Heinemann. (A standard gemology text that will likely cover cultured pearls).

CourseOutcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the basic concepts of pearl formation and types of pearls.	9, 11	Remembering	01
CO-2	Explain the biological and chemical properties of pearls.	9	Understanding	02
CO-3	Apply techniques for pearl Implantation and harvesting.	1, 9	Applying	03
CO-4	Analyze the factors in fluencing Nacresecretion and pearl quality.	6	Analyzing	04
CO-5	Evaluate the economic aspects and marketing strategies of pearl farming.	11	Evaluating	05
CO-6	Propose innovative techniques for improving pearl quality and sustainability.	9	Creating	06

CourseCategory/Title: **SEC-2 Practicals of Pearl Culture Techniques**	
Course Code: ZOO-SECP -235	Course Credits: **2** L-T-Pperweek:**0-0-4**
Total Contact Hours:30	**Duration of Lecture:**1Hour
College Assessment(CA) Marks:20	**University Assessment(UA)Marks:** 30

Course Objectives

- Learn aboutthetypes,formation,andbiologicalaspectsofpearl-producing mollusks.
- Studythechemicalcomposition,classification, andphysicalpropertiesof pearls.
- Understandsurgicalprocedures,grafttissuepreparation,andpost-surgicalcareinpearl farming.
- Assess market trends, pricing factors,and theeconomic viability of pearl culture inIndia.

SEC-2SEC ZOO-SECP 235 Practicals of Pearl Culture Techniques

Sr.No.	Practical	Hours
1	Study of morphology and anatomy of fresh water pearl mussel-*Lamellidens marginalis* (D)	**4**
2	Study of morphology and anatomy of marine water pearl oyster-*Pinctada fucata* (D)	**4**
3	Study of life cycle of *Lamellidens marginalis*.(D)	**4**
4	Study of life cycle of *Pinctada fucata*.(D)	**4**
5	Study of common species of fresh water pearl mussel used for pearl formation.(D)	**4**
6	Establishment of fresh water pearl cultureunit. (E)	**4**
7	Study of types of pearl-i.Natural pearl and ii. Cultured pearl(D)	**4**
8	Embedding beads insuitable mussel for pearl culture. (E)	**4**
9	Study of diseases of fresh water pearl mussel.(D)	**4**
10	Studyof predators of fresh water pearl mussel.(D)	**4**
11	Economic importance of pearl.	**4**
12	Maintenance of fresh water pearl cultureunit.(E)	**4**
13	Study of pearl formation.(D)	**4**
14	Study of chemical composition of pearl.(D)	**4**
15	Visit to any pearl culture unit.	**4**
Study Resources	•	

Reference books

- Adhikari S and Chatterjee D. K. (2008) Management of Tropical Freshwater Ponds.Daya Publ.
- Boyd,C.E.andTucker,C.S.(1992).Water Quality and Pond Soil Analysisf or Aquaculture, Alabama Agricultural Experimental Station, Auburn University.
- APHA,AWWA,WPCF. (1998).Standard Methods for the Examination of Water and Wastewater, 20th Ed.
- Boyd CE.(1979).Water Quality in Warm Water Fish Ponds. Auburn University.
- ICAR.(2006).Handbook of Fisheries and Aquaculture.
- TR, Maita Y and Lalli CM. (1984).A Manual of Chemical and Biological Methods for Seawater Analysis. Pergamon Press.

- Alagarswami, K., & Victor, A. C. C. (1976). *Pearl culture*. Central Marine Fisheries Research Institute.
- Boutan,L.(1925). *Laperle* (Thepearl).FélixAlcan.
- Cahn,A.R.(1949).*Pearl culture in Japan*.United States Government Printing Office.
- George, R. W., & George, J. J. (1990). *Australian pearl farming manual*. Fishing Industry Training Board of Western Australia.
- Gervis, M. H., & Sims, N. A. (1992). *The biology and culture of pearls*. WorldFish Center.
- Landman, N. H., Tanabe, K., &Shigeta, Y. (Eds.). (2001). *Cephalopods: Present and past*.Springer. (While focused on cephalopods, some chapters might touch upon pearl formation as a biological process).
- Lucas, A., & Southgate, P. C. (Eds.). (2012). *Aquaculture: Farming aquatic animals and plants*. Wiley-Blackwell. (Likely includes a comprehensive section on pearl culture).
- Southgate, P. C., & Lucas, J. S. (2008). *Aquaculture of pearl oysters* (2nd ed.). WorldFish Center. (This is a highly relevant and likely key resource).
- Strack,E.(2006).*Pearls*.Rühle-Diebener-VerlagGmbH&Co.KG.(Oftenconsidered a comprehensive gemological perspective on pearls, including cultured pearls).
- Webster,R.(2000).*Gems:Theirsources,descriptionsandidentification*(5thed.). Butterworth-Heinemann. (Astandard gemology text that will likely cover cultured pearls).

CourseOutcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the basic concepts of pearl formation and types of pearls.	9, 11	Remembering	01
CO-2	Explain the biological and Chemical properties of pearls.	9	Understanding	02
CO-3	Apply techniques for pearl Implantation and harvesting.	1, 9	Applying	03
CO-4	Analyze the factors influencing nacre secretion and pearl quality.	6	Analyzing	04
CO-5	Evaluate the economic aspects and marketing strategies of pearl farming.	11	Evaluating	05
CO-6	Propose innovative techniques for improving pearl quality and sustainability.	9	Creating	06

SEMESTERIV

Course Category/Title: **DSC-8 Agricultural Pest management**	
Course Code:**ZOO-MJ-241**	CourseCredits: **2** L-T-Pperweek:**2-0-0**
Total ContactHours: **30**	Duration of Lecture:**1Hour**
College Assessment(CA)Marks: **20**	University Assessment (UA) Marks:**30**

Course Objectives

- Learn about different types of agricultural pests, their identification, and their impact on crops.
- Study various pest control techniques, including chemical, biological, and integrated pest management (IPM).
- Assess the cost-benefit analysis and ecological consequences of pest control methods.
- Investigate eco-friendly pest management practices used inorganic farming.

DSC-8 ZOO-MJ-241Agricultural Pest management

Unit No	Title	Hours	Marks
I	**Introduction to Agricultural Pests:** Classification of pests • Agricultural Pests • Stored grainPests • Veterinary Pests • Public Health Pests • Structura lPests	**07**	**12**
II	Study of Major pests of agricultural importance w.r.t. Marks of identification, life cycle, nature of damage and control measures • Red cotton bug, • Brinjal Fruit and Shoot Borer, • Pyrilla, • Non insect pests: Rat	**08**	**13**
III	**Control Measures:** • Primary control and their types. • Chemical control and their types. • Biological control; Parasite ,Predators, Parasitoids. • Integrated Pest Management (IPM): ▪ Principles and its components of IPM ▪ Advantages and disadvantages of IPM • Types of Pesticides and Their Mode of Action**:** ▪ Stomach poison ▪ Contact poison ▪ Systemic poison ▪ Fumigants • Pesticide appliances: a) Sprayer and b) Duster	**08**	**13**
IV	**Pest Management in Organic Farming** • Principles of organic pest management. • Pest control strategies inorganic agriculture:- biopesticides, crop rotation, and companion planting • Challenges and benefits of organic pest control.	**07**	**12**

Referencebooks

- Abrol, D. P. (2014). *Integrated pest management: Principles and practice*. Springer India. (Specifically addresses the Indian context).
- Aktar, M., & Gopalakrishnan, N. (2020). *Plant pests and their management*. Apple Academic Press.
- Dent, D. (2000). *Insect pest management* (2nd ed.). CABIPublishing. (A widelyused textbook).
- Dhaliwal, G. S., & Arora, R. (2001). *Integrated pest management: Concepts and approaches*. Kalyani Publishers. (Focuses on Indian agriculture).
- Flint,M.L.,&vandenBosch,R.(1981).*Introductiontointegratedpestmanagement*. Plenum Press. (A foundational text in IPM).
- Horowitz, A. R., & Ishaaya, I. (Eds.). (2004 onwards). *Insecticides with novel modes of action: Mechanisms and application*. Springer. (A series of volumes focusing on specific insecticide groups).
- Metcalf, R. L., & Metcalf, E. R. (1993). *Destructive and useful insects: Their habits andcontrol*(5thed.).McGraw-Hill.(Aclassicentomologyandpestmanagementtext).
- Pedigo, L. P., & Rice, M. E. (2009). *Entomology and pest management* (6th ed.). Pearson Prentice Hall. (A comprehensive textbook).
- Peshin, R., & Dhawan, A. K. (Eds.). (2009). *Integrated pest management: Field and laboratory manual*. Springer. (Practical guide with laboratory exercises).
- Reigart, J. R., & Roberts, J. R. (1999). *Recognition and management of pesticide poisonings* (5th ed.). U.S. Environmental Protection Agency. (Important for understanding the risks associated with pesticides).
- Sharma, H. C. (2001). *Cotton pests and their management*. Daya Publishing House. (Focuses on a major crop in India).
- Singh, D. S. (2002). *Agricultural entomology* (2nd ed.). Kalyani Publishers. (General text covering insect pests in Indian agriculture).
- Sutherland, J. P. (Ed.). (2020). *Ecological pest management: A global perspective*. CABI Publishing. (Emphasizes ecological approaches).
- Van Emden, H. F., & Service, M. W. (2004). *Pest and vector management* (Vol. 3). Cambridge University Press. (Broader perspective on pest management).

CourseOutcomes (COs)

CO No.	Uponc ompletion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the classification and characteristics of agricultural pests.	9, 11	Remembering	01
CO-2	Explain the life cycle, nature of damage, and control measures of major insect pests.	9	Understanding	02
CO-3	Apply knowledge to identify and Implement appropriate pest control measures.	1, 9	Applying	03
CO-4	Analyze the economic and environmental impact of pest control methods.	6	Analyzing	04

CO-5	Evaluate the effectiveness of different pest management strategies, including IPM and organic methods.	11	Evaluating	05
CO-6	Develop sustainable pest management plans incorporating eco-friendly practices.	9	Creating	06

Course Category/Title: **DSC-9 Practicals corresponding to Agricultural Pest management**	
Course Code: **ZOO-MJP-243**	Course Credits: **2** L-T-Pperweek:**0-0-4**
Total Contact Hours: **60**	Duration of Lecture:**1Hour**
College Assessment(CA)Marks: **20**	University Assessment (UA)Marks:**30**

Course Objectives

- Learn about the life cycle, nature of damage, and control measures of key agricultural pests.
- Study and compare different pest control methods ,including biological, chemical, and integrated pest management (IPM).
- Understand the principles of pesticide application, formulation, and their impact onfood safety.
- Gain hands-on experience in pest collection ,identification, and preservation techniques.

DSC-9ZOO-243 Practicals corresponding to Agricultural Pest management

Sr.No.	Practical	Hours
1	Study of life cycle, nature of damage and control measures of Red Cotton bug	**4**
2	Study of lifecycle ,nature of damage and control measures of Brinjal Fruit and Shoot Borer.	**4**
3	Study of lifecycle, nature of damage and control measures of *Pyrilla*.	**4**
4	Study of IPM using Red cotton bugas model pest.	**4**
5	To study predators used in pest control program (Mantids)	**4**
6	To study parasitoids used in pest control program(*Trichogramma*)	**4**
7	To study pesticide appliances(Knapsack sprayer/Rocker sprayer).	**4**
8	To study Principle and application of duster.	**4**
9	To detect pesticides residues in foodstuffs.	**4**
10	To study chemical control, insecticides and their formulation.	**4**
11	Observe case studies of successful biological control programs (e.g., ladybug release).	**4**
12	Prepare are port comparing various pest management strategies.	**4**
13	Study of insect collection and preservation techniques.	**4**
14	Collection & submission of various agricultural Insect Pests.	**4**
15	Field visit: Visittonear by Agricultural field/Institute	**4**

Reference books

- Abrol, D. P. (2014). *Integrated pest management: Principles and practice*. Springer India. (Specifically addresses the Indian context).
- Aktar, M.,& Gopalakrishnan, N. (2020).*Plant pests and their management*. Apple Academic Press.
- Dent, D. (2000). *Insect pest management* (2nd ed.). CABI Publishing. (A widely used textbook).
- Dhaliwal,G.S.,&Arora,R.(2001).*Integratedpestmanagement:Conceptsand approaches*. Kalyani Publishers. (Focuses on Indian agriculture).

- Flint,M.L.,&vandenBosch,R.(1981).*Introductiontointegratedpestmanagement*. Plenum Press. (A foundational text in IPM).
- Horowitz, A. R., & Ishaaya, I. (Eds.). (2004 onwards). *Insecticides with novel modes of action: Mechanisms and application*. Springer. (A series of volumes focusing on specific insecticide groups).
- Metcalf, R. L., & Metcalf, E. R. (1993). *Destructive and useful insects: Their habits andcontrol*(5thed.).McGraw-Hill.(Aclassicentomologyandpestmanagementtext).
- Pedigo, L. P., & Rice, M. E. (2009). *Entomology and pest management* (6th ed.). Pearson Prentice Hall. (A comprehensive textbook).
- Peshin, R., & Dhawan, A. K. (Eds.). (2009). *Integrated pest management: Field and laboratory manual*. Springer. (Practical guide with laboratory exercises).
- Reigart, J. R., & Roberts, J. R. (1999). *Recognition and management of pesticide poisonings* (5th ed.). U.S. Environmental Protection Agency. (Important for understanding the risks associated with pesticides).
- Sharma, H. C. (2001). *Cotton pests and their management*. Daya Publishing House. (Focuses on a major crop in India).
- Singh, D. S. (2002). *Agricultural entomology* (2nd ed.). Kalyani Publishers. (General text covering insect pests in Indian agriculture).
- Sutherland, J. P. (Ed.). (2020). *Ecological pest management: A global perspective*. CABI Publishing. (Emphasizes ecological approaches).
- Van Emden, H. F., & Service, M. W. (2004). *Pest and vector management* (Vol. 3). Cambridge University Press. (Broader perspective on pest management).

Course Outcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the life cycle, nature of damage, and control measures of major agricultural pests.	9, 11	Remembering	01
CO-2	Explain the principles and applications of various pest Control techniques, including IPM and biological control.	9	Understanding	02
CO-3	Apply knowledge to identify and use appropriate pest control measures, including pesticide Appliances.	1, 9	Applying	03
CO-4	Analyze the effectiveness of biological control methods using predators and parasitoids in pest Management.	6	Analyzing	04
CO-5	Evaluate pesticide residues in food stuffs and assess the impact Of chemical control strategies.	11	Evaluating	05
CO-6	Design an integrated pest management plan by combining Different pest control strategies for sustainable agriculture.	9	Creating	06

Course Category / Title: **MIN4 Animal Type-*Labeo rohita***	
Course Code:**ZOO-MN-246A**	Corse Credits: **2** L-T-P per week:**2-0-0**
Total Contact Hours: **30**	Duration of Lecture:**1Hour**
College assessment (CA)Marks: **20**	University Assessment(UA):Marks:**30**

Course Objectives

- Learn about its taxonomy, habit, habitat, and external characteristics.
- Study its digestive, respiratory, circulatory, nervous, and reproductive systems.
- Understand respiration, blood circulation, excretion, and reproductive mechanisms.
- Examine its role in aquaculture, fisheries, and conservation.

Animal Type-*Labeo rohita*

Unit	Content	Hours	Marks
I	Study of *Labeo rohita* w.r.t. following • Systematic position, Habit and Habitat. • Geographical distribution • External Characters- • Shape ,Size and Colour. • Division of the body-Head, Trunk and Tail. • Body wall ,Exoskeleton –Fins and scales ,endoskeleton	**08**	**13**
II	Digestive system • Alimentary canal, Digestive glands-Liver and Pancreas. • Food and feeding habitat • Circulatory System Blood vascular system- Blood, Heart	**07**	**12**
III	Respiratory system and Blood vascular system • Respiratory organs-gills • Air bladder, Physiology of respiration Nervous system • Central nervous system- Brain, spinal cord • Sensory organs –Internal ear and eye	**08**	**13**
IV	Urinogenital system • Excretory system-Kidney, Ureter, urinary bladder and excretion • Reproductive system-Male and Female reproductive system • Economic importance	**07**	**12**

References

- R. L. Kotpal, 3rd edn. Modern Text Book of Zoology, Vertebrates Rastogi Publications,
- Meerut.
- P.S Dhamiand J. K .Dhami ,(1982),Chordate Zoology, R. Chand and Co., New Delhi.
- Young, J.Z.(2004).The Life of Vertebrates. III Edition Oxford university press.

- Jordan E. L. & Verma P.S.(2003),Chordates Zoology. S. Chand & Company Ltd. New Delhi.
- S. N. Prasad, Kitab Mahal, A text Book of Vertebrate Zoology– Alahabad.
- H .S. Bharah and Kavita Juneja A Text Book of Chordates
- Dr. Shaikh Hafiz Mahmad, An Introduction of *Labeo rohita* : Fresh water major carp ,International Publications, Kanpur.

Course Outcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the systematic position, habit, habitat, and external characteristics of *Labeo rohita*.	9, 11	Remembering	01
CO-2	Explain the structure and function of the digestive, respiratory, circulatory ,nervous ,and excretory Systems of *Labeo rohita*.	9	Understanding	02
CO-3	Apply knowledge to identify and describe the physiological processes of respiration, digestion, And excretion in *Labeo rohita*.	1, 9	Applying	03
CO-4	Analyze the reproductive system, fertilization process, and embryonic development of *Labeo rohita*.	6	Analyzing	04
CO-5	Evaluate the economic and ecological significance of *Labeo rohita* in fisheries and aquaculture.	11	Evaluating	05
CO-6	Design sustainable management strategies for *Labeo rohita* Fisheries based on its biological and ecological traits.	9	Creating	06

Course Category/Title:**MIN5 Practicals based on Animal Type- *Labeo rohita***	
Course Code:**ZOO-MNP-2246B**	Corse Credits: **2** L-T-Pper week:**0-0-4**
Total Contact Hours: **60**	Duration of Lecture:**1Hour**
College assessment (CA)Marks: 2**0**	University Assessment (UA):Marks:**30**

Course Objectives

- Learn about its classification, habit, habitat, and external characteristics.
- Study the structure and function of the digestive, circulatory, respiratory, nervous, and excretory systems.
- Understand the male and female reproductive systems, fertilization, and embryonic development.
- Evaluate the role of *Labeo rohita* in aquaculture, fisheries, and sustainable fish farming.

MIN5-ZOO-MNP246 B Practicals based on Animal Type-*Labeo rohita*

Sr.No.	Practical	Hours
1	Study of Systematic position, Habit and Habitat of *Labeo rohita.*	**4**
2	Study of External characters of *Labeo rohita.*	**4**
3	Study of Digestive system of *Labeo rohita*	**4**
4	Study of Circulatory system of *Labeo rohita*	**4**
5	Study of Respiratory system of *Labeo rohita*	**4**
6	Study of Nervous system of *Labeo rohita*	**4**
7	Study of excretory system of *Labeo rohita*	**4**
8	Study of Male reproductive system of *Labeo rohita*	**4**
9	Study of Female reproductive system of *Labeo rohita*	**4**
10	Temporary preparations of scales and eye ball muscles of *Labeo rohita.*	**4**
11	Observations of membranous labyrinthin *Labeo rohita*	**4**
12	Observations of air bladder in *Labeo rohita*	**4**
13	Study of fins in *Labeo rohita*	**4**
14	Study of economic importance of *Labeo rohita*	**4**
15	Visit to a fish culture unit for the study of Rohu fish.	**4**
Study Resources		

Reference books

- R. L.Kotpal,3rdedn.ModernTextBookofZoology,VertebratesRastogiPublications,
- Meerut.
- P.S Dhamiand J. K. Dhami,(1982), Chordate Zoology ,R .Chandand Co., New Delhi.
- Young, J.Z.(2004).The Life of Vertebrates. III Edition Oxford university press.
- Jordan E. L.&Verma P.S.(2003),Chordates Zoology .S. Chand & Company Ltd. New Delhi.
- S. N. Prasad, Kitab Mahal A text Book of Vertebrate Zoology, Alahabad.
- H.S. Bhamrah and Kavita Juneja, A Text Book of Chordates
- Dr. Shaikh Hafiz Mahmad, An Introduction of *Labeo rohita* : Fresh water major carp, International Publications, Kanpur.

Course Outcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the systematic position, habit, habitat, and external Features of *Labeo rohita*.	9, 11	Remembering	01
CO-2	Explain the structure and function of the digestive, circulatory, respiratory, nervous, and Excretory systems.	9	Understanding	02
CO-3	Apply knowledge to perform anatomical studies, such as Temporary preparations of scales, eyeballs, and air bladders.	1, 9	Applying	03
CO-4	Analyze the reproductive system of *Labeo rohita*, including the differences between male and Female systems.	6	Analyzing	04
CO-5	Evaluate the importance of *Labeo rohita* in aquaculture, fisheries, And its economic significance.	11	Evaluating	05
CO-6	Design sustainable fish culture techniques based on the biological and ecological characteristics of *Labeo rohita*.	9	Creating	06

Course Category /Title:**OE-4 Sericulture**	
Course Code: **ZOO-OE-247**	Course Credits:**2**T-L-Pperweek: **2-0-0**
Total Contact Hours:30	Duration of Lecture:**1Hour**
College assessment(CA)Marks:20	**University Assessment (UA):Marks: 30**

Course Objectives

- Learn about the history, scope, taxonomic classification, and different types of silk worms.
- Study the external and internal morphology, silk gland structure, and digestive system.
- Understand propagation techniques, rearing methods, and the use of rearing appliances.
- Identify major diseases and pests affecting silkworms and develop control strategies.

OE-4 ZOO-OE-247Sericulture

Unit	Topics	Hours	Marks
I	**Introduction** • Sericulture: Definition ,history, present Status • Scope of sericulture • Silk producing centers • Taxonomic position • Types of silkworms and their Distribution(Muga, Eri, Tussar, Mulberry)	**7**	**12**
II	**Biology of Silkworm:** • Lifecycle of *Bombyx mori* w.r.t. external and internal morphology of Egg, larva, Pupa, adult • Structure and function of silk gland and secretion of silk	**7**	**12**
III	**Sericulture** • Harvesting of mulberry-a)Shoot Cutting b)Leaf plucking and c) Bud plucking. • Advantages and disadvantages of shoot rearing • **Sericulture**: Rearing house and Rearing Techniques. • Rearing Appliances: a) Rearing stand, b) Ant wells, c) Rearing trays, d)Paraffin paper, e)Foam rubber strip, f) Chopsticks, g) Feathers, h) Leaf chamber, i) Chopping board, j) Chopping knives, k) Mats, l)Cleaning nets, m) Mountages, n)Feeding tray and o)Miscellaneous appliances	**8**	**13**
V	**Important Diseases and Pests:** • Protozon disease: Pebrine • Viral disease: Nuclear Poly hedrosis Virus (NPV) • Fungal disease: Muscardine- White, green, yellow • Pests of silk worm: Uzi flies, Dermestid beetles, ants and vertebrates • Prevention and control of diseases and pests	**8**	**13**

Reference books

- Handbook of silkworm rearing: Agricultural and Technical manual-1, FuziPub.Co. Ltd., Tokyo, Japan1972.
- Jolly Ed .M.S., Appropriate Sericulture Techniques; Director, CSR & TI Mysore.
- Krishnaswamy S., Improved Method of Rearing Youngage silkworm; reprinted CSB, Bangalore, 1986.
- Narsimhanna M.N., Manual of Silk worm Egg Production; CSB, Bangalore1988.
- Sengupta K., A Guide for Sericulture; Director, CSIR & TI ,Mysore 1989.
- Silk worm Rearing; Wupang - Chun and Chen Da- Chung , Pub. By FAO, Rome 1988.

Course Outcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the history, scope, and Classification of sericulture, along with different types of silkworms.	9, 11	Remembering	01
CO-2	Explain the life cycle, morphology, and physiological processes of *Bombyx mori*, Including silk gland function.	9	Understanding	02
CO-3	Apply knowledge of mulberry cultivation and silk worm rearing techniques, including the use of Rearing appliances.	1, 9	Applying	03
CO-4	Analyze the impact of environmental factors on silk worm growth, silk production, And disease susceptibility.	6	Analyzing	04
CO-5	Evaluate pest and disease management strategies to improve silk production and prevent economic losses.	11	Evaluating	05
CO-6	Design innovative sericulture practices to enhance productivity and sustain ability in silk farming.	9	Creating	06

CourseCategory/Title:**VC-1Economic Zoology**	
TitleofthePaper**: ZOO-VC-244**	CourseCredit**: 2** L-T-Pperweek:**2-0-0**
TotalContactHours: **30**	DurationofLecture:**1Hour**
CollegeAssessment(CA)Marks: **20**	UniversityAssessment (UA)Marks:**30**

Course Objectives

- Learnthedefinition,scope,andsignificanceofeconomiczoologyinvariousindustries such as lac culture, poultry, and goat farming.
- Studythelifecycle,morphology,secretionprocess,cultivation,andeconomic importance of lac insects.
- Understand the classification, feeding strategies, common diseases, and management practices in poultry and goat farming.
- Assess the role of lac culture, poultry, and goat farming in India's economy and their impact on sustainable livelihoods.

VC-1:ZOO-VC-244EconomicZoology

Unit	Content	Hours	Marks
I	**Definition and Scope of Economic Zoology** • Definition of economic zoology • Importance of economic zoology in agriculture and food production • Scope of economic zoology :livestock, poultry, fishery, apiculture, sericulture, and lac culture	**04**	**08**
II	**Economic Zoology :Lac Culture** • Introduction, Systematic Position and Host Plant sofLacInsect • Morphology and lifecycle • Secretion, Cultivation, Uses and Composition of Lac. • Lac Cropand Pruning • Natural enemies, prevention and control • Economic importance of Lac Industry in India	**06**	**12**
III	**Economic Zoology-Poultry** • Definition, scope and importance of poultry • Classification and characteristics of poultry breeds.(Aseel, Kadaknath, and Leghorn) • Nutrient requirement and feeding strategies for different poultry species. • Common Poultry Diseases and their control- Bacterial Disease – Fowl Cholera; Fungal Disease – Aspergillosis; Viral Disease – Newcastle Disease; Parasitic Disease – Coccidiosis • EconomicimportanceofPoultryinIndia	**10**	**15**
IV	**EconomicZoology-Goatry** • Definition,scopeandimportanceofGoatary	**10**	**15**

	• ClassificationandcharacteristicsofGoatbreeds-1.Jamunapari2. Beetal 3. Barbari 4. Osmanabadi 5. Sirohi 6. Changthangi • Common Goat diseases their diagnosis and treatment in goats: Bacterial Disease–Brucellosis; Fungal Disease– Ringworm; Viral Disease – Peste des Petits Ruminants (PPR); Parasitic Disease – Coccidiosis • Goatry equipment and facilities • EconomicimportanceofGoatry,inIndia		

Reference Books:

- G.S. Shuklaand V.B. Upadhyay(2016):Economic Zoology, Rastogi Publications
- Ghorai,N(2021)Lac Culture In India
- Debiprasanndasetal,(2021)Text Book on Poultry Management, NPH
- H.V. S. Chauhan(2018) Poultry Diseases, Diagnosis and Treatment, New Age International Private Limited
- Jindal et al, (2013) Goat Production and Health Management, New India Publishing Agency-Nipa
- CarolA.Amundson(2019)HowtoRaiseGoats:ThirdEdition,EverythingYouNeedtoKnow: Breeds, Housing, Health and Diet, Dairy and Meat, Kid Care (FFA), Voyageur Press**.**
- P.V.Sreenivasaiah(2015)TextbookofPoultryScience,WriteAndPrintPublications.

CourseOutcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the definition, scope, and applications of economic zoology in various industries.	9, 11	Remembering	01
CO-2	Explain the lifecycle, morphology, and cultivation techniques of lac insects.	9	Understanding	02
CO-3	Apply knowledge of poultry and goat farming techniques, including breed Selection and disease management.	1, 9	Applying	03
CO-4	Analyze the impact of feeding strategies, environmental conditions, and disease control measures on Poultry and goat health.	6	Analyzing	04
CO-5	Evaluate the economic contributions of lac culture, poultry, and goat farming inIndia.	11	Evaluating	05
CO-6	Propose In no votives farming techniques to improve productivity and sustainability in lac culture, poultry, And goat farming.	9	Creating	06

CourseCode/Title:**VC-2 Practicalsof Economic Zoology**	
Title of the Paper**: ZOO-VCP-245**	Course Credit **: 2** L-T-P per week:**0-0-4**
Total Contact Hours: **60**	Duration of Lecture :**1Hour**
College Assessment (CA) Marks: **20**	University Assessment (UA) Marks:**30**

Course Objectives

- Learn about different species of lac insects, their life cycle, and the techniques of lac rearing and cultivation.
- Study different go at breeds, their feeding and nutritional requirements, and their role in sustainable agriculture.
- Identify poultry breeds, study common poultry diseases, and understand farm management techniques.
- Assess the contribution so lac culture, goat farming, and poultry farming to rural development and food security.

VC-2 Course Content : Practicals on Economic Zoology

Sr. No	Practical	Hours
1	Study of different species of lac insects.	**4**
2	Study of life cycle of Lac insect	**4**
3	Study of lac insect rearing techniques and lac cultivation.	**4**
4	Study of Lac Products- shellac, lacdye, and lacwax	**4**
5	Study of different poultry breeds based on their physical Characteristics.	**4**
6	Study of Poultry Diseases and their control-Bacterial Disease –Fowl Cholera; Fungal Disease– Aspergillosis; Viral Disease–Newcastle Disease; Parasitic Disease – Coccidiosis	**4**
7	Poultry parasites and their control	**4**
8	Study of Poultry equipment's	**4**
9	Study of poultry farm design	**4**
10	Study of different goat breeds	**4**
11	Study of feeding and nutritional requirements of goats.	**4**
12	Formulate a Feedration for goats.	**4**
13	Study of the importance of goats in rural development and Sustainable agriculture.	**4**
14	Study of Goat diseases their diagnosis and treatment in goats: Bacterial Disease–Brucellosis; Fungal Disease– Ringworm; Viral Disease– Peste des Petits Ruminants (PPR); Parasitic Disease – Coccidiosis	**4**
15	Visit to Lac culture unit / Goatary / Poultry unit	**4**

Reference Books:

1. G.S.ShuklaandV.B.Upadhyay(2016):EconomicZoology,RastogiPublications

2. Ghorai, N(2021) Lac Culture In India
3. Debi prasanndasetal,(2021)Text Book on Poultry Management, NPH
4. H.V.S .Chauhan(2018)Poultry Diseases, Diagnosis and Treatment, New Age International Private Limited
5. Jindaletal,(2013)GoatProductionandHealthManagement,NewIndiaPublishing Agency- Nipa
6. CarolA.Amundson(2019)HowtoRaiseGoats:ThirdEdition,EverythingYouNeed to Know: Breeds, Housing, Health and Diet, Dairy and Meat, Kid Care (FFA), Voyageur Press**.**
7. P.V. Sree nivasaiah(2015)Textbook of Poultry Science, WriteAnd Print Publications

Course Outcomes (COs)

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Bloom's Taxonomy Classification	Cognitive Level
CO-1	Recall the species, lifecycle, and Rearing techniques of lac insects.	9, 11	Remembering	01
CO-2	Explain the nutritional requirements, feed formulation, and importance of goats in sustainable agriculture.	9	Understanding	02
CO-3	Apply knowledge of poultry farm Design ,equipment, and disease control strategies.	1, 9	Applying	03
CO-4	Analyze the impact of diseases and parasites on poultry and goat farming, and identify control measures.	6	Analyzing	04
CO-5	Evaluate different lac products (shellac ,dye, wax) and their economic significance.	11	Evaluating	05
CO-6	Design improved techniques for lac cultivation, goat nutrition, and poultry farm management to enhance productivity.	9	Creating	06

CourseCategory/Title: **OJT /Int. corresponding to the Major (Core) Subject**	
Title of the Paper **: ZOO- 242**	Course Credit **:4**L-T-P per week:**0-0-8**
Total Contact Hours: **120**	Duration of Lecture:**1Hour**
College Assessment (CA)Marks: **40**	University Assessment (UA) Marks:**60**

Course Objectives

- Students will demonstrate the ability to formulate a research question, conduct literature reviews, and design and execute a zoological research project.
- Students will gain hands-on experience through field studies, study tours, and/or on- the-job training, applying zoological knowledge to real-world scenarios.
- Students will effectively communicate research findings through written reports, oral presentations, and visual documentation.
- Students will analyze and interpret zoological data, synthesize information from various sources, and apply their knowledge to address biological problems.

Students need to complete one month on job training (OJT) Or internship (Int.) in any industry related to major subject.

On-the-job training or **Internship** in zoology provides practical skills, exposure to real-world scenarios, and networking opportunities within the field. It enhances participants' employ ability, allows them to explore specific areas of interest, and complements their academic knowledge with practical experience. It is important to note that the availability of on-the-job training programs may vary based on geographical location and the specific institutions and organizations within the field of zoology.

Pratap College Amalner, (Autonomous)

S Y B.Sc. Zoology
Equivalence for Old Syllabus 2019-20

PaperCode	Old Course– 2019	PaperCode	New Course–NEP- 2025
ZOO301	Physiology	ZOO-MJ-231	Parasitology
ZOO302	Biochemistry	ZOO-MJ-IKS-232	Ethnozoology
ZOO303	Practicalof Physiology & Biochemistry	ZOO-MJP-233	Practical of Parasitology and ethnozoology
SECI ZOO304	Apiculture	ZOO-SEC-234	Pearl Culture Technique
		ZOO-MN-236A	Animal Type- Grasshopper
		ZOO-MN-236 B	Ecology
		ZOO-MNP-236 C	Practical of A and B
		ZOO-OE-237	Ornamental Fish Culture
		ZOO-SECP-235	Practical of Pearl Culture Technique

PaperCode	Old Course– 2019	PaperCode	New Course– 2025
ZOO 401	Genetics	ZOO-MJ-241	Agriculture Pest Management
ZOO 402	Evolutionary Biology	ZOO-CEP-242	Community Engagement Programme Zoology
ZOO 403	Practical of Genetics and Evolutionary Biology	ZOO-MJP-243	Practical of Agriculture Pest Management
SECII ZOO404	Medical Diagnostics	ZOO-VC-244	Economic Zoology
		ZOO-VCP-245	Practical of Economic Zoology
		ZOO-MN-246 A	Animal Type Labeo rohita
		ZOO-MNP-246 B	Practical of Animal Type Labeo rohita
		ZOO-OE-247	Sericulture