PSGR Krishnammal College for Women

College of Excellence, nirf 2021-6th Rank
Autonomous and Affiliated to Bharathiar University
Reaccredited with A++ grade by NAAC, An ISO 9001: 2015 Certified Institution
Peelamedu, Coimbatore-641004

DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES BASED CURRICULAR FRAMEWORK (LOCF)
(I & II Semesters)

BACHELOR OF ZOOLOGY
2021 – 2024 BATCH

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Peelamedu, Coimbatore-641004

PROGRAMME LEARNING OUTCOMES (PLO's)

After completion of the programme, the student will be able to

PLO1: Appreciate the complexities of various levels of organization in the living forms and address controversial biological issues in a scientific way

PLO2: Imbibe transformational impact on the quality of education, and to adopt scientific temper and live with scientific values

PLO3: Assess the scope of animal biology, opt relevant areas for inter-disciplinary and trans-disciplinary studies

PLO4: Understand and apply the core strands of the knowledge acquired in various disciplines of life sciences to become a potential entrepreneur

PLO5: Acquire quality life science education to turn into an outstanding researcher/teacher/career woman/entrepreneur and a responsible citizen

PROGRAMME SPECIFIC OUTCOME (PSO's)

The students at the time of graduation will

PSO1: Gain the knowledge of Zoology through theory and practicals.

PSO2: Analyze the relationships among animals with their ecosystems.

PSO3: Learn to classify the major groups of organisms under different phyla, understanding the functioning of organisms, compare and contrast anatomical and physiological characteristics of animals.

PSO4: Understand good laboratory practices as per laboratory standards, handling the sophisticated instruments/equipment to develop technical skills, research oriented skills about research methodologies, effective communication and skills of problem solving methods.

PSO5: Understand the applications of zoological knowledge in Agriculture, Medical and daily life and apply the knowledge for employment- Indian Forest Service, Sericulture, Fisheries, Veterinary, Clinical Laboratory, Museum Curator, departments and Entrepreneurship. They can go for Indian Forest Service and other competitive examinations.

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DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)

BACHELOR OF ZOOLOGY – 2021-2024 BATCH

Sem	Part	Subject code	Title of the Paper		Instruction Hours/Week	Contact Hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2101/ HIN2101/ FRE2101	Language T/H/F Paper I	Language	6	86	4	3	50	50	100	3
	II	ENG2101	English Paper I	English	6	86	4	3	50	50	100	3
	III A	AS21C01	Invertebrata	CC	6	86	4	3	50	50	100	5
	III A	AS21CP1	Core Practical I	CC	3	45		-	-	-	-	-
	III A	CE21A01	Allied-Chemistry for Biologists - I	GE	4	56	4	3	30	45	75	4
	III A	CE21AP1	Allied -Chemistry Practical for Biologists	GE	3	45		-	-	-	-	-
	IV	NME19B1/ NME19A1/ NME12W/ NME12AS/ NME12GS/ NME21ES/	Basic Tamil / Advanced Tamil / Women Studies/ Ambedhkar Studies/ Gandhian Studies/ Entrepreneurship	AEC	2/2/2	28/26/26	2/4/4	-/2/-	50/ 50/ 100	50/ 50/-	100/ 100/ 100	2
II	II	TAM2102/ HIN2102/ FRE2102	Language T/H/F Paper – II	Language	6	86	4	3	50	50	100	3
	II	ENG2102	English Paper II	English	5	71	4	3	50	50	100	3
	III A	AS21C02	Chordata Paper II	CC	5	71	4	3	50	50	100	5
	III A	AS21CP1	Core Practical I	CC	3	45		3	50	50	100	4
	III A	CE21A02	Allied-Chemistry for Biologists-II	GE	5	71	4	3	30	45	75	4

	III A	CE21AP1	Allied -Chemistry Practical for Biologists	GE	3	45		3	25	25	50	2
	IV		Open Course - Self Study Online Courses		-	-	-	-	-	-	-	-
	IV	NME19B2/ A2	Basic Tamil/Advanced Tamil**	AEC	-	-	-	-	-	-	-	-
	III B	NM12GAW	Foundation Course –1 (General Awareness)		Self study (Online)							Grade
	V	21PELS1	Professional English (Science /Management/ Humanities/Commerce)	AEC	3	45	3		50	50	100	2

CC – Core Courses
GE – Generic Elective
AEC – Ability Enhancing Course

CA – Continuous Assessment
ESE - End Semester Examination

QUESTION PAPER PATTERN

CORE & ALLIED PAPERS

Continuous Internal Assessment: 50 Marks

SECTION	MARKS	TOTAL
A – 5 × 2 Marks	10	50
B – 4 × 5 Marks	20	
C - 2/3 × 10 Marks	20	

End Semester Examination: 100 Marks

SECTION	WORD LIMIT	MARKS	TOTAL
A-11/13 X 2 Marks	One or two sentences	22	100
B - 5/7 X 6 Mark	300	30	
C- 4/6 X 12 Marks	600-800	48	

WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF CONTINUOUS INTERNAL ASSESSMENT

Theory

	CIA I	CIA II	Model Exam	Assignment/ Class Notes	Seminar	Quiz	Class Participation	Application of knowledge Innovation and creativity	Attendance	Max Marks
Core / Allied	7	7	10	4	5	4	5	5	3	50
SBS	5	5	15	-	-	-	-	-	-	25
ALC		10	15	-	-	-	-	-	-	25
Information Security	40	40		10		10				100

Practical

	Model Exam	**Lab Performance**	**Regularity in Record Submission**	**Attendance**	**Maximum Marks**
Core / Allied / SBS	12	20	8	3	40

RUBRICS

Assignment/ Seminar

Maximum - 20 Marks (converted to 4 marks)

Criteria	**4 Marks**	**3 Marks**	**2 Marks**	**1 Mark**
Focus Purpose	Clear	Shows awareness	Shows little awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organisation: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good

Style: Details and Examples	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

CLASS PARTICIPATION

Maximum - 20 Marks (converted to 5 marks)

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark	Points scored
Level of Engagement in Class	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class	Student contributes to class and asks questions occasionally	Student rarely contributes to class by offering ideas and asking no questions	Student never contributes to class by offering ideas	
Listening Skills	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.	
Behavior	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class	
Preparation	Student is almost always	Student is usually prepared for	Student is occasionally prepared for	Student is rarely prepared for	Student is almost never	

	prepared for class with required class materials	class with required class materials	class with required class materials	class with required class materials	prepared for class.	
					Total	

MAPPING OF POS WITH COS

COURSE	PROGRAMME OUTCOMES				
	PO1	PO2	PO3	PO4	PO5
COURSE – AS21CO1					
CO1	S	S	M	M	L
CO2	S	S	M	M	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	M	M
COURSE – AS21CO2					
CO1	L	S	M	M	M
CO2	L	S	M	M	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S
COURSE – AS21CP1					
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S

COURSE NO AS21CO1	COURSE NAME INVERTEBRATA	Category	L	T	P	Credit
		Theory	86	4	-	5

Preamble

To understand the basic classification, structure and functional details of invertebrates and to appreciate the diversity of life on earth with respect to invertebrates.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the distinguished characteristics, the biodiversity, habitat, adaptation, organization and taxonomic status of invertebrates	K_1
CLO2	Understand the importance of multicellularity significant to anatomical and physiological up gradation of the invertebrates	K_2
CLO3	Interpret the evolution of organ systems and differences in functional morphology of higher invertebrates	K_3
CLO4	Compare the advancement in systemic organization of invertebrates and connecting link to Chordates.	K_4
CLO5	Application of Recent emerging technologies in learning and research in Zoology	K_5

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M
CLO5	S	S	S	M	M

S- Strong; M-Medium; L-Low

INVERTEBRATA – AS21CO1 (86 Hrs)

Unit 1 **(19hrs)**

Phylum Protozoa

General characteristics and Classification up to classes

Type Study: *Paramecium caudatum* –External features, Nutrition, Locomotion- effective stroke, recovery stroke, Metachronal rhythm, Reproduction-Asexual- Binary fission ,Sexual reproduction Conjugation, Autogamy, Endomixis, Hemimixis and Cytogamy.

General Essays

- Locomotion and Reproduction in Protista
- Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica*
- Evolution of symmetry and segmentation of Metazoa

Phylum Porifera

General characteristics and Classification up to classes

Type Study: *Leucosolenia botryoides*- External features, Body wall, Spicules, Canal System, Nutrition, Reproduction.

General Essays:

- Canal System in sponges
- Economic importance of sponges

Unit 2 **(19 hrs)**

Phylum Coelenterata

General characteristics and Classification up to classes

Type Study: *Obelia geniculata* - External features, Histology of the colony, Cnidoblast and its functions, Life History of Obelia, Metagenesis.

General Essays

- Corals & coral reefs
- Polymorphism in Coelentrates

Phylum Helminthes

General characteristics and Classification up to classes

Type Study: *Taenia solium*- External features, Body wall, Feeding, Respiratory system, Excretory system-flame cells, Nervous system, Reproductive system, Life cycle- Onchosphere and Cysticercus larvae. Life cycle and pathogenicity of *Taenia solium*

General Essays

- Life cycle and pathogenicity of: a) *Wuchereria bancrofti*, b) *Drancunculus medinensis*, c) *Ancylostoma duodenale*
- Parasitic adaptations in Helminthes.

Unit 3 **(19 hrs)**

Phylum Annelida

General characteristics and Classification up to classes

Type Study: *Megascolex mauritii* - External features, Body wall, Coelom, Locomotion, Digestive system, Respiratory system, Excretory system-Meganephridia, Micronephridia, Pharyngeal nephridia, Nervous system, Reproductive system.

General Essays

- Metamerism in annelids.
- A Brief Account on vermiculture.

Phylum Arthropoda

General characteristics and Classification up to classes

Type study: *Periplaneta americana* -External features, Body wall, Mouthparts, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs, excretory system, Reproductive system.

General Essays

- Peripatus- Affinities as a living fossil.
- Metamorphosis in Insects
- A Brief Account on Apiculture.

Unit 4 **(19 hours)**

Phylum Mollusca

General characteristics and Classification up to classes

Type Study: *Pila globosa* -External features, Shell, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs- Eyes, Osphradium, Statocyst, Tentacles, Excretory system, Reproductive system..

General Essays

- Torsion in Mollusca.
- A Brief Account on Pearl Culture.

Phylum Echinodermata

General characteristics and Classification up to classes

Type Study: *Asterias rubens.*- External features, Pedicellaria-Structure and Function, Digestive system, Respiratory system, Water vascular system-Structure and Function, Circulatory system-Perihaemal and Haemal system, Nervous system ,Sense organs, Excretory system, Reproductive system.

General Essays

- Larval forms of Echinoderms and their evolutionary significance.
- Economic importance in Echinoderms.
- Affinities with Chordates

Unit 5 **(10 hours)**

Introduction to technologies in Industry 4.0, Applications –Automated taxonomic Identification of invertebrates, Confocal Image processing of invertebrates for identification and classification, Bio mimicry/biomimetics of invertebrates –Ant colony optimization algorithms, Beekeeping using Machine learning, Detection and identification of Stored –Grain insects using Deep learning, IOT based smart monitoring for sericulture, Virtual e-museum.

Text Books:

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Jordan E.L and Verma P.S	Invertebrate Zoology	S. Chand and Co	2014
2	N. C. Nair, N. Soundara Pandian, S. Leelavathy,	A Text Book of Invertebrates	Saras Publications	2013

	T. Murugan			
3	P. Kaliraj, T. Devi, Higher Education for Industry 4.0 and Transformation to Education 5.0			

Reference Books:

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1.	Dhami P.S. and Dhami J.K	Invertebrate Zoology	S. Chand & Co	2012, 5th edition
2.	EkambaranathaAyyar, M. & Ananthakrishnan,T.N	Manual of Zoology Vol-I (Invertebrata) Part I & II	Vishwanathan (p) Ltd. Chennai	2010
3.	FatikBaran Mandal	Invertebrate Zoology	Eastern Economy Edition	2012, 1st Edition
4.	Kotpal R.L., Agarwal S.K and Ketarpal R.P.R	Modern Text Book of Zoology Invertebrates	Rastogi Publications	12th Edition 2019
5.	Barrington EJW	Invertebrate Structure and Function	ELBS and Nelson	1979, 2nd edition
6.	Ruppert and Barnes, R.D.	Invertebrate Zoology	Holt Saunders International	2006
7.	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. an d Spicer, J.I.	The Invertebrates: A New Synthesis	Blackwell Science	2002, 3rd Edn.
8.	Jan A. Pechenik	Biology of the Invertebrates	McGraw-Hill Companies	2014, 7th Revised Edition
9	Fatik, Mandal, Baran,	Biology of non-chordates	Publisher: PHI learning Private Limited , Delhi	2018
10.	Fatma El-Bawab	Invertebrate Embryology and Reproduction	Academic Press	2020
11.	John H. Byrne	The Oxford Handbook of Invertebrate Neurobiology	Oxford University Press	2019

Related Online Contents

1. Introduction to Industry 4.0 and Industrial Internet of Things by Prof. Sudip Mishra, IIT Kharagpur.
2. A Complete Guide to Industry 4.0-Udemy

Reference

1. https://academic.oup.com/sysbio/article/68/6/876/5368535
2. https://besjournals.onlinelibrary.wiley.com/doi/10.1111/2041-210X.13428
3. https://www.mdpi.com/2313-7673/4/3/62/htm
4. https://www.bio-mar.com/biological-materials-biomimetics
5. https://www.sciencedirect.com/science/article/abs/pii/S1568494609000672
   https://www.hyperhyve.com/post/beekeeping-using-machine-learning

6. https://www.researchgate.net/publication/322958397_Detection_of_stored-grain_insects_using_deep_learning
7. https://www.ijrte.org/wp-content/uploads/papers/v8i2/B1801078219.pdf

COURSE NO AS21CO2	COURSE NAME CHORDATA	Category	L	T	P	Credit
		Theory	71	4	-	5

Preamble

To understand basic classification, structural and functional details of chordates and to interpret the evolutionary relationships among the major taxa

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the general and specific characteristics of the different classes and the organization of the representative types.	K_1
CLO2	Recognize and describe the major groups of chordates	K_2
CLO3	Interpret the unique features, taxonomy and functional morphology of different classes of chordates	K_3
CLO4	To examine chordate diversity, systematics, their affinities and adaptations to different modes of life.	K_4
CLO5	To evaluate the evolutionary relationships, of the major taxa and their economic importance.	K_4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	L	S	M	M	M
CLO2	L	S	M	M	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S
CLO5	S	S	S	S	S

S- Strong; M-Medium; L-Low

CHORDATA-AS21CO2 (71hrs)

UNIT I: (15 Hrs)

Phylum Chordata Introduction, Three fundamental Chordate characters, Advancements of Chordates over other phyla. Brief classification of chordate with characters.

PROTOCHORDATA- General Characters

Type study: Amphioxus- Affinities and Systematic Position, Habits and Habitat, External features, Body wall, Coelom, Atrium, Digestive System, Respiratory mechanism, Circulatory system, excretory system and Reproductive system.

General Essays

- Dipnoi- lung fishes-affinities and systematic Position
- Retrogressive metamorphosis in Urochordata
- Overview of Phylogenetic analysis using Machine learning

PISCES- General Characters

General characteristics of Chondrichthyes and Osteichthyes, classification up to order

Type study: Shark - Systematic Position, Habits and Habitat, External features, Exoskeleton-Placoid Scales, Digestive System**,** Respiratory system & Mechanism of respiration, Circulatory system -Blood, Heart and pericardium, Arterial system, Venous system, Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves. Sense organs-Olfactory organs, Eyes, Internal ears, Neuromast or lateral line system, Ampullae of Lorenzini. Urinogenital system.

General Essays

- Accessory respiratory organs in fishes
- Migration, Osmoregulation and Parental care in fishes
- General account of a) *Oreochromis mossambicus* b) *Labeo rohita* c) *Catla catla*
- Virtual E-museum to identify and learn different species of Pisces

UNIT II: AMPHIBIA (14 hrs)

General characteristics and classification up to order

Type study: Frog- Systematic Position, Habits and Habitat, External features, Sexual dimorphism, Digestive System, Respiratory system- Cutaneous respiration, Buccal respiration and Pulmonary respiration. Respiratory mechanism-inspiration and expiration. Circulatory system-Blood, Heart-Internal structure, Arterial system, Venous system. Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves. Sense organs- Tango receptors, Taste buds, Olfactory organs, Internal structure and functions of Eye and Ear, Urinogenital system

General Essays

- Origin of *Tetrapoda* (Evolution of terrestrial ectotherms)

- Parental care in Amphibia
- Neoteny in Amphibia
- Outline on Image processing for taxonomic classification

UNIT III: REPTILIA **(14 hrs)**

General characteristics and classification up to order

Type study: Calotes - Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system- Respiratory mechanism, Circulatory system-Blood, Heart-Internal structure, Arterial system, Venous system. Nervous system- Brain, Spinal cord, cranial nerves and spinal nerves. Sense organs, Jacobson's organs, internal structure and functions of Eye and Ear, Urinogenital system

General Essays

- Affinities of *Sphenodon*
- Poison apparatus and Biting mechanism in snakes, First aid treatment for snake bite.
- Common poisonous and non – poisonous snakes in India.
- Overview of artificial intelligence for modelling to study Reptile behaviour

UNIT IV: AVES **(14 hrs)**

General characteristics and classification up to order

Type study: Pigeon -Systematic Position, Habits and Habitat, External features, Feathers- Structure of a typical feather in Pigeon, Types of feathers in pigeon .Muscular System- Flight muscles, Digestive System, Respiratory system- Syrinx and voice production, Air sacs and functions. Respiratory mechanism, Circulatory system-Blood, Heart-Internal structure, Arterial system, Venous system. Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves, Structure and function of Eye and Ear, Urinogenital system.

General Essays

- *Archaeopteryx*—a connecting link
- Flightless birds, Migration in birds.
- GPS Tracking systems to study bird behaviour and predict their migration

UNIT V: MAMMALIA **(14 hrs)**

General characteristics and classification up to order

Type study: Rabbit- Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system, Circulatory system-Blood, Heart-Internal structure, Arterial system, Venous system. Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves. Structure and function of Eye and Ear, Excretory system, Reproductive system.

General Essays

- Affinities of Prototheria; Adaptive radiation with reference to locomotory appendages
- Aquatic adaptations in mammals.
- GPS Tracking systems for monitoring the locomotion of wild animals.

Text Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Jordan.E.L and Verma.P.S	Chordate Zoology	S.Chand& Co	2014
2	A. Thangamani S. Prasannakumar L.M. Narayanan N. Arumugam,	A Text Book of Chordates	Saras Publications	2013

Reference Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Ekambaranatha Ayyar.M & Ananthakrishnan.T.N	A Manual of Zoology Vol.II-Part I & II	S.Vishwanathan Pvt.Ltd	2010
2	Kotpal R.L	Modern Text Book of Zoology – Vertebrates	Global Media Publications	2012
3	B Waterman, Allyn J	Chordate Structure and Function	Mac Milan & Co.,	1971
4	Young, J. Z	The Life of Vertebrates	Oxford university press	2004, 3rd Edn.
5	Pough H.	Vertebrate life	Pearson International	9th Edn.
6	Darlington P.J.	The Geographical Distribution of Animals	R.E. Krieger Pub Co.,	3rd Edn.
7	Hall B.K. and Hallgrimsson B.	Strickberger's Evolution	Jones and Bartlett Publishers Inc.	4th Edn.
8.	Malcolm Jollie	Chordate Morphology	Franklin Classics Trade Press	2017
9.	Marshall and Williams Edited by Veer Baala Rastogi	Parker and Haswell Textbook of ZOOLOGY - Vertebrates -	Medtech Science Press	Volume I 2021
10.	Neil Shubin, Kenneth P. Dial, Elizabeth L. Brainerd	Great Transformations in Vertebrate Evolution	University of Chicago Press	2015
11.	Kevin Padian, Vivian de Buffrénil, Armand J. de Ricqlès, Louise Zylberberg	Vertebrate Skeletal Histology and Paleohistology	CRC Press	2021
12.	Ezra Samberg	Vertebrate Zoology	Syrawood Publishing House	2018

References

1. https://www.biorxiv.org/content/10.1101/2020.01.10.902239v4.full
2. https://www.sciencedirect.com/science/article/abs/pii/S0920548919300935
3. https://link.springer.com/article/10.1007/s10336-012-0908-1
4. https://wildlifeact.com/about-wildlife-act/monitoring-tracking-technology/
5. http://emuseum.psgrkcw.com/

COURSE NUMBER AS21CP1	COURSE NAME CORE PRACTICAL I	Category	L	T	P	Credit
		Practical	-	-	90	4

Preamble

- To enable the students to expose practically
- To learn the taxonomy of invertebrates and Chordates.
- To understand the relationships between invertebrates, Chordates and their environment.
- To learn the location and appearance of internal organs in a typical insect.
- To understand the structure and functional organization of animals.

Course Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic concepts of zoological classification, the diversity and relationships between major groups of invertebrates and Chordates. Dissection helps to distinguish among different types of tissues within an insect's body.	K2
CLO2	Analyse invertebrates and Chordates in laboratory and field conditions, and use taxonomic keys for identification.	K4
CLO3	Application of the skills necessary for self-employment in adopting Field observations of sericulture and Apiary farm.	K3
CLO4	To compare and contrasts the life processes in different phyla.	K5

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium; L-Low

CORE PRACTICAL - I AS21CPI (90 Hrs)

Dissections (**10 hrs)**

1. Cockroach Digestive system, Nervous system, Male & Female Reproductive systems
2. Fish (*Tilapia*) - Viscera, Digestive system, Reproductive system
3. Earthworm- Digestive system, Nervous system
4. Prawn – Nervous system
5. Digital Dissection

Mounting

1. Mounting of scales of a marketable fish.
2. Mounting of gill arch.
3. Mounting of earthworm setae (**7 hrs)**
4. Mounting of mouth parts of cockroach
5. Mounting of Prawn appendages
6. Whole mount of Euglena, Amoeba and Paramecium, Binary fission and Conjugation in Paramecium

Spotters

Classify giving reasons:-Paramecium, Leucosolenia, Obelia colony, Prawn, Octopus, Star fish, Ascidian, Shark, Salamander, Pigeon, Bat **(8 hrs)**

Draw labelled sketches:-T.S. of Tape worm, Leech, Amphioxus, Frog – Skull, Vertebrae - typical, VIII, IX, X, Pectoral girdle, Pelvic girdle, Fore limb and Hind limb **(8 hrs)**

Relate Structure and function: - Gemmule, Scolex of tapeworm, Nereis -parapodium, Heteronereis, Prawn - Appendages, Honey bee-Queen, Drone, Worker; Quill feather, Tortoise – Carapace and plastron, Narcine – Electric organ, Placoid scale, Snake poison apparatus. **(6 hrs)**

Write descriptive notes:- Nauplius larva , Pila, Bipinnaria larva, Balanoglossus, Echeneis - Sucker fish, Draco - Flying lizard, Rat snake, Cobra, Hyla **(7 hrs)**

Give biological significance: - Tape worm entire, Chaetopterus, Peripatus,Limulus, Scorpion, Pearl oyster, Hippocampus male and female, Exocetus – Flying fish, Chameleon **(6hrs)**

Study of six common birds from different orders **(2 hrs)**
Observations on the Metamorphosis of silkworm **(1hr)**
Field observations combined with photography and/or videography

1) Study of live water specimens in nearby water bodies **(5 hrs)**
2) Study of insect fauna in the college campus **(5 hrs)**
3) Visit to a sericulture farm **(5 hrs)**
4) Visit to an Apiary **(5 hrs)**
5) Visit to a Museum **(5 hrs)**
6. Study of pond ecosystem **(5 hrs)**

Culture Methods

1) Culture of unicellular organisms (Amoeba, Paramecium, and Euglena)
2) Culture of multicellular organisms (Earthworm) **(5 hrs)**

Reference Books:

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2011
2	Lal S. S.	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004
3	Lal S. S.	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004

Pedagogy:
Demonstration, practical, dissection, slides, spotters, field visit, culture methods, power point presentation, e-content, group discussion.