2023 - T

Course Structure & Syllabus for B.Sc./M.Sc./M.Phil. Zoology
CBCS Pattern
2023-2024 Academic Year onwards

T

Zoology

RAJAH SERFOJI GOVERNMENT COLLEGE (Autonomous)
THANJAVUR 613005

B. SC. ZOOLOGY

(based on TANSCHE)

SYLLABUS

FROM THE ACADMIC YEAR

2023-2024

RAJAH SERFOJI GOVERNMENT COLLEGE (Autonomous)
THANJAVUR 613005

JULY 2023

RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS), THANJAVUR -613005

B.Sc. ZOOLOGY COURSE STRUCTURE

(for the candidates admitted from the academic year **2023-2024** onwards)

Part	Course	Subject Code	List of Courses	Credit	Hours per week (L/T/P)	Exam Hours	Marks		Total
							Int.	Ext.	
First Year Semester-I									
I	LT1	T1T1	Tamil – I	3	6	3	25	75	100
II	LE1	T1E1 T1E1P	English – I (Written Exam) English Practical	2 1	4 2	2 1	15 10	45 60 30 40	100
III	CC1	T1ZO1	Invertebrata	5	5	3	25	75	100
III	CC2	T1ZO2	Invertebrata – Lab Course	3	3	3	25	75	100
III	EC1	T1GCH1	General Chemistry I	3	4	3	25	75	100
III	EC2	T2GCH2	Chemistry - Practical	-	2	-	-	-	-
IV	SEC1	T1ZOSE1	Biocomposting for Entrepreneurship	2	2	3	25	75	100
IV	FC	FC	Foundation Course	2	2	3	25	75	100
Total				**21**	**30**				
II Semester									
I	LT2	T2T2	Tamil - II	3	6	3	25	75	100
II	LE2	T2E2 T2E2P	English – I (Written Exam) English Practical	2 1	4 2	2 1	15 10	45 60 30 40	100
III	CC3	T2ZO3	Chordata	5	5	3	25	75	100
III	CC4	T2ZO4	Chordata – Lab Course	3	3	3	25	75	100
III	EC2	T2GCH2	General Chemistry - Practical	3	2	3	25	75	100
III	EC3	T2GCH3	Chemistry III	4	4	3	25	75	100
IV	SEC2	T2ZOSE2	Wildlife Conservation and Management	2	2	3	25	75	100
IV	SEC3	T2ZOSE3	Aquarium Keeping	2	2	3	25	75	100
Total				**25**	**30**				
Second Year Semester-III									
I	LT3	T3T3	Tamil - III	3	6	3	25	75	100
II	LE3	T3E3 T3E3P	English – I (Written Exam) English Practical	2 1	4 2	2 1	15 10	45 60 30 40	100
III	CC5	T3ZO5	Cell Biology	5	5	3	25	75	100
III	CC6	T3ZO6	Cell Biology – Lab Course	3	3	3	25	75	100
III	EC4	T3GBO1	Botany I	3	4	3	25	75	100
III	EC5	T4GBO2	Botany - Practical	-	2	-	-	-	-
IV	SEC4	T3ZOSE4	Ornamental Fish farming and management	1	1	3	25	75	100
IV	SEC5	T3ZOSE5	Apiculture	2	2	3	25	75	100
IV	EVS	T4ES	Environmental Studies	-	1	-	-	-	-
Total				**20**	**30**				

Semester-IV									
I	LT4	T4T4	Tamil - IV	3	6	3	25	75	100
II	LE1	T4E4 T4E4P	English – I (Written Exam) English Practical	2 1	4 2	2 1	15 10	45 60 30 40	100
III	CC7	T4ZO7	Environmental Biology	4	4	3	25	75	100
III	CC8	T4ZO8	Ecotoxicology – Lab Course	3	3	3	25	75	100
III	EC5	T4GBO2	Botany - Practical	3	2	3	25	75	100
III	EC6	T4GBO3	Botany II	4	4	3	25	75	100
IV	SEC6	T4ZOSE6	Sericulture	2	2	3	25	75	100
IV	SEC7	T4ZOSE7	Medical Laboratory Techniques	2	2	3	25	75	100
IV	EVS	T4ES	Environmental Studies	2	1	3	25	75	100
Total				**26**	**30**				
Third Year Semester-V									
III	CC9	T5ZO9	Evolutionary Biology	4	6	3	25	75	100
III	CC10	T5ZO10	Animal Physiology	4	6	3	25	75	100
III	CC11	T5ZO11	Developmental Biology	4	5	3	25	75	100
III	CC12	T5ZO12	Ecophysiology- Practical	3	3	3	25	75	100
III	EC7	TZOECA	Animal Behaviour	3	4	3	25	75	100
III	EC8	TZOECF	Agricultural Entomology	3	4	3	25	75	100
IV	VE	T5VE	Value Education	2	2	2	25	75	100
IV			Internship/Industrial Training	2	-	-	-	-	-
Total				**25**	**30**				
Semester-VI									
III	CC13	T6ZO13	Genetics	5	6	3	25	75	100
III	CC14	T6ZO14	Biotechnology	5	6	3	25	75	100
III	CC15	T6ZO15	Biotechnology - Practical	4	4	3	25	75	100
III	EC9	TZOECG	Microbiology	3	6	3	25	75	100
III	EC10	TZOECH	Apiculture	3	6	3	25	75	100
IV	PCS	T6ZOPC	Professional Competency Skill	2	2	2	25	75	100
V			Extension Activity	1	-	-	-	-	-
Total				**23**	**30**				

Total Credits: 140

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Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	11	14	11	14	22	21	93
Part IV	4	4	3	5	4	2	22
Part V	-	-	-	-	-	1	1
Total	21	24	20	25	26	24	**140**

***Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

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RAJAH SERFOJI GOVERNMENT COLLEGE (AUTONOMOUS), THANJAVUR -613005
B.Sc., ZOOLOGY COURSE STRUCTURE
(for the candidates admitted from the academic year **2023-2024** onwards)

List of Elective courses
Part -A (Generic)

S.No	Course Code	Title of the Course
1	T1GCH1	General Chemistry –I
2	T2GCH2	General Chemistry - Practical
3	T2GCH3	General Chemistry- II
4	T3GBO1	Botany – I
5	T4GBO2	Botany - Practical
6	T4GBO3	Botany–II
7		FOOD, NUTRITION AND HEALTH
8		FOOD TECHNOLOGY
9		FOOD CHEMISTRY
10		HERBAL MEDICINE

Part -B (Discipline)

S.No	Course Code	Title of the Course
1	TZOECA	ANIMAL BEHAVIOUR
2	TZOECB	WILDLIFE CONSERVATION AND MANAGEMENT
3	TZOECC	NANOBIOLOGY
4	TZOECD	HUMAN REPRODUCTIVE BIOLOGY
5	TZOECE	RADIATION BIOLOGY
6	TZOECF	AGRICULTURAL ENTOMOLOGY
7	TZOECG	AQUACULTURE
8	TZOECH	APICULTURE
9	TZOECI	VERMICULTURE
10	TZOECJ	MEDICAL LABORATORY TECHNIQUES
11	TZOECK	AQUARIUM KEEPING
12	TZOECL	SERICULTURE

B. Sc. Zoology (2023-2024)
SEMESTER – I - INVERTEBRATA

Course Code CC1	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext.	Total
T1ZO1	INVERTEBRATA	Core	Y	-	-	-	4	4	25	75	100

Learning Objectives	
CO1	To understand the basic concepts of lower animals and observe the structure and functions.
CO2	To illustrate and examine the systemic and functional morphology of various group of animal modes of life and to estimate the biodiversity.
CO3	To compare and distinguish the general characteristics of reproduction in lower animals and parasitic adaptation in invertebrates.
CO4	To infer and integrate the structures and distinct features of invertebrate phyla.
CO5	To understand and able to distinguish the characteristic feature of phylum and economic importance of invertebrate animals

UNIT	Details	No. of Hours	Course Objectives
I	Principles and outline classification of Invertebrates. Binomial nomenclature. **Protozoa:** General characters and classification up to classes with examples. Type study: *Paramecium*- external features, nutrition, locomotion and reproduction. General Topics**:** Parasites of Protozoan- Life cycle of *Plasmodium.*	15	CO1
II	**Porifera:** General characters and classification up to classes with examples. Type study: Sycon sponge (*Scypha*)- external structur,canal system and reproduction. General Topics**:** Canal system in sponges. **Coelenterata :** General characters and classification up to classes with examples - Type study: *Obelia* - Structure of polyp, medusa and life history of Obelia. General Topics: Corals- Coral reefs and its importance.	15	CO2
III	**Platyhelminthes:** General characters and classification up to classes with examples. Type Study: *Taenia solium* (Tap worm)– external structure, excretion, reproduction and life cycle. General Topics: Parasitic adaptations of Liver fluke. **Aschelminthes:** General characters and classification up to classes with examples - Type Study: *Ascaris lumbricoides:* External structure, Digestive system, Reproductive and Life cycle. General Topics: Parasitic adaptations in nematodes.	15	CO3

IV	**Annelida:** General characters and classification up to classes with examples -Type study: *Nereis* -external structure, digestive system, nervous system and reproductive system. General Topics: Adaptive radiation in Annelida. **Arthropoda:** General characters and classification up to classes with examples - Type Study: *Penaeus indicus*- external structure, respiratory system, digestive system, circulatory system, reproductive system. General Topics: Crustacean larval forms and their significances	15	CO4
V	**Mollusca:** General characters and classification up to classes with examples - Type Study: *Pila globosa* - external structure, digestive system, respiratory system, nervous system and reproductive system. General Topics: Economic importance of Molluscs. **Echinodermata:** General characters and classification up to classes with examples. Type Study: *Asterias rubens* (Star fish)- external structure, water vascular system, circulatory system, and reproductive system. General Topics: Larval forms of Echinoderms.	15	CO5
	Total	75	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Understand the basic concepts of invertebrate animals and recall its structure and functions.	PO1
CO2	Illustrate and examine the systemic and functional morphology of various groups of animal mode and estimate the biodiversity.	PO1, PO2
CO3	To compare and distinguish the various physiological processes and organ systems in lower animals.	PO4, PO6
CO4	Infer and integrate the adaptation in animals and classify, identify and distinct feature of invertebrate animals.	PO4, PO5, PO6
CO5	To distinguish the structural organization of evolutionary aspects and describe the important biological process.	PO3, PO8

Text Books (Latest Editions)	
1.	Ekambaranatha Iyer, 2000. A Manual of Zoology, 10th edition. Viswanathan, S., Printers & Publishers Pvt Ltd
2.	Jordan, E.L. and Verma P.S, 1995. Invertebrate Zoology, 12th edn. S. Chand& Co.
3.	Kotpal, R.L, 1992. Protozoa, Porifera, Coelenterata, Annelida, Arthropoda.

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.
2.	**Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition, Blackwell Science**
3.	Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson
4.	Hyman L.H, 1955. The invertebrates - Vol. I to Vol. VII – Mc Graw Hill Book Co.
5.	Parker, J. and Haswell, 1978. A text book of Zoology Vol. I - Williams and Williams.

Web Resources	
1.	https://www.nationalgeographic.com/animals/invertebrates/
2.	https://bit.ly/3kABzKa
3.	https://www.nio.org/
4.	https://greatbarrierreef.org/

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong (3) M-Medium (2) L-Low (1) B N

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SEMESTER – I- INVERTEBRATA LAB COURSE

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext.	Total
T1ZO2	**INVERTEBRATA LAB COURSE**	Core	Y	-	-	-	4	4	25	75	100

Learning Objectives	
CO1	To identify the different groups of invertebrate animals by observing their external characteristics.
CO2	To understand the organs, organ system and their functions in lower animals.
CO3	To get knowledge about the different modes of life and their adaptation based on the environment.
CO4	Able to dissect and display the internal organs and mount the mouthparts and scales of invertebrates.

UNIT	**Details**	**No. of Hours**	**COs**
I	**Major Dissection:** **Cockroach**: Circulatory system, Nervous system and Reproductive system. **Leech**: Nervous System and Reproductive system. **Earthworm**: Nervous System and Reproductive system. **Prawn**: Nervous System ***Pila globosa***: Nervous system.	9	CO1
II	**Minor Dissection:** Cockroach: Digestive system. Earthworm: Digestive system. *Pila globosa*: Digestive system. Freshwater Mussel: Digestive system.	9	CO2
III	**Mounting:** Earthworm: Body setae and Pineal setae. *Pila globosa*: Radula. Freshwater Mussel: Pedal ganglia Prawn: Appendages.	9	CO3
IV	**Mounting:** Cockroach: Salivary apparatus and Mouth parts. Honey Bee: Mouth parts. House fly: Mouth parts. Mosquito: Mouth parts.	9	CO4
V	**Spotters:** **(i). Protozoa:** Amoeba, *Paramecium*, *Paramecium* -Binary fission and	9	CO5

	Paramecium -Conjugation, *Entamoeba histolytica*, *Plasmodium*. **(ii). Porifera:** *Scypha* (Sycon), *Spongilla*, *Euplectella*, *Hyalonema*, *Spicules*, *Gemmule*. **(iii). Coelenterata:** Obelia Colony, Obelia Medusa, *Aurelia*, *Physalia*, *Velella*, *Gorgonia*, *Pennatula*, *Sea anemone* (Meteridium), Miandrina. **(iv). Platyhelminthes:** *Dugesia* (Planaria), *Fasciola hepatica*, *Miracidium* larva, Redia larva, *Cercaria* larva, *Taenia solium*, *Taenia solium* -scolex, *Taenia solium* -proglottid. **(v). Nemathelminthes:** *Ascaris lumbricoides* (Male & Female), *Dracunculus medinensis*, *Ancylostoma duodenale*, *Wuchereria bancrofti* **(vi). Annelida:** *Nereis*, *Nereis* parapodium, *Aphrodite*, *Chaetopterus*, *Hirudinaria granulose* (Leech), Trochophore larva **(vii). Arthropoda:** Cockroach, Prawn, *Scorpion*, *Scolopendra*, *Sacculina*, *Limulus*, *Peripatus*, Nauplius larva, Mysis larva, Zoea larva, **(viii). Mollusca:** *Pila globosa*, Fresh water mussel, *Aplysia*, *Murex*, *Chiton*, *Sepia*, *Loligo*, *Octopus*, *Nautilus*, Glochidium larva **(ix). Echinodermata:** *Asterias rubens*, *Sea urchin*, *Sea cucumber*, *Sea lily* (Antedon), Bipinnaria larva, Auricularia larva.		
	Total	**45**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Identify and label the external features of different groups of invertebrate animals.	PO1
CO2	Illustrate and examine the circulatory system, nervous system and reproductive system of invertebrate animals.	PO1, PO2
CO3	Differentiate and compare the structure, function and mode of life of various groups of animals.	PO4, PO6
CO4	To compare and distinguish the dissected internal organs of lower animals.	PO4, PO5, PO6
CO5	Prepare and develop the mounting procedure of economically important invertebrates.	PO3, PO8

Text Books (Latest Editions)	
1.	Ekambaranatha Iyyar and T. N. Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai
2.	Ganguly, Sinha and A shikari, 2011. Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp.
3.	Sinha, Chatterjee and Chattopadhyay, 2 0 1 4. Advanced Practical Zoology, Books & Allied Ltd; 3rd Revised edition, 1 07 0 pp.
4.	Lal,S. S, 2016 . Practical Zoology Invertebrate, Rastogi Publications.

5.	Verma, P. S. 2010. A Manual of Practical Zoology: Invertebates, S Chand, 4 97pp.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science.
2.	Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition. Holt Saunders International Edition.
3.	Barrington, E.J.W. (1979). *Invertebrate Structure and Functions*. II Edition, E.L.B.S. and Nelson
4.	Boradale, L.A. and Potts, E.A. (1961). *Invertebrates: A Manual for the use of Students*. Asia Publishing Home.
5.	Lal, S.S. 2005. A text Book of Practical Zoology: Invertebrate, Rastogi, Meerut
Web Resources	
1.	https://nbb.gov.in/
2.	http://www.agshoney.com/training.htm
3.	https://icar.org.in/
4.	http://www.csrtimys.res.in/
5.	http://csb.gov.in/
	https://iinrg.icar.gov.in/
	https://www.nationalgeographic.com/animals/invertebrates/

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

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Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong (3) **M-Medium (2)** **L-Low (1)**

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SEMESTER – I- BIOCOMPOSTING FOR ENTREPRENEURSHIP

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext.	Total
T1ZOSE1	BIOCOMPOSTING FOR ENTREPRENEURSHIP	SEC	Y	-	-	-	2	2	25	75	100

Learning Objectives:

- To highlight the importance of Biocomposting for entrepreneurship in waste management.
- To enable students for setting up Biocompost units and bins for waste reduction.

Course outcomes:

- The students will gain knowledge about the process of Biocomposting.
- Students will be able to demonstrate Biocomposting techniques for various end applications like solid waste management, industrial waste recycling using sugarcane bagasse, etc.
- To gain knowledge about the economic cost of establishing small Biocompost units as a cottage industry.

Unit – I

Biocomposting – Definition, types and ecological importance.

Unit – II

Types of Biocomposting technology – Field pits/ground heaps/ tank/large-scale/batch and continuous methods.

Unit – III

Preparation of Biocompost pit and bed using different amendments.

Unit – IV

Applications of Biocompost in soil fertility maintenance, promotion of plant growth, value added products, waste reduction, etc.

Unit – V

Economics of establishment of a small biocompost unit – project report proposal for Self Help Group (Income and employment generation).

Practical

- Preparation procedures for Biocompost pit.
- Selection of Biocompost material, separation of Compostable and Non-compostable materials.
- Packing and marketing of Biocompost.
- Field visit to Biocomposting unit.

References

Bikas R. Pati& Santi M. Mandal (2016). Recent trends in composting technology.

Van der Wurff, A.W.G., Fuchs, J.G., Raviv, M., Termorshuizen, A.J. (Editors) 2016. Handbook for Composting and Compost Use in Organic Horticulture. BioGreenhouse COST Action FA 1105, www.biogreenhouse.org.

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B. Sc. Zoology (2023-2024)

SEMESTER – I – FOUNDATION COURSE ON ZOOLOGY

Course Code CC1	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
FC	FOUNDATION COURSE ON ZOOLOGY	FC	Y	-	-	-	2	2	25	75	100

Learning Objectives	
CO1	To understand the basic concepts of lower animals and observe the structure and functions.
CO2	To illustrate and examine the systemic and functional morphology of various group of animal modes of life and to estimate the biodiversity.
CO3	To compare and distinguish the general characteristics of reproduction in lower animals and parasitic adaptation in invertebrates.
CO4	To infer and integrate the structures and distinct features of invertebrate phyla.
CO5	To understand and able to distinguish the characteristic feature of phylum and economic importance of invertebrate animals

UNIT	Details	No. of Hours	Course Objectives
I	Animal Kingdom-Systematics. Definition and Kinds. Taxonomy-Stages of Taxonomy (alpha, beta and gamma). Biological Classification: History, theories –artificial classification-natural system of classification. Phylogenetic System of Classification Taxonomy	6	CO1
II	Hierarchy Categories: Species, Genus, Family, Order, Class, Phylum, Kingdom, Domain. Concept of Species. Species Types	6	CO2
III	Specimen Collection: Collection methods, cleaning and preservation, methods, curation process. Skeletons. Dry and wet preservation of specimen	6	CO3
IV	Alcoholic Preservation, Formalin Preservation. Advantages and disadvantages. Taxidermy	6	CO4
V	Introduction to Zoology Laboratory: Microscope, slide preparation, Museum and Museum Specimen types and preparation. Role of Zoological Museum in teaching	6	CO5
	Total	**30**	

Course Outcomes		
COs	On completion of this course, students will;	
CO1	Understand the basic concepts of invertebrate animals and recall its structure and functions.	PO1
CO2	Illustrate and examine the systemic and functional morphology of various groups of animal mode and estimate the biodiversity.	PO1, PO2
CO3	To compare and distinguish the various physiological processes and organ systems in lower animals.	PO4, PO6
CO4	Infer and integrate the adaptation in animals and classify, identify and distinct feature of invertebrate animals.	PO4, PO5, PO6
CO5	To distinguish the structural organization of evolutionary aspects and describe the important biological process.	PO3, PO8

Text Books

1.	Ekambaranatha Iyer, 2000. A Manual of Zoology, 10th edition, Viswanathan, S., Printers & Publishers Pvt Ltd
2.	Jordan, E.L. and Verma P.S, 1995. Invertebrate Zoology, 12th edn. S. Chand& Co.
3.	Kotpal, R.L, 1992. Protozoa, Porifera, Coelenterata, Annelida, Arthropoda.
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2.	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A New Synthesis, III Edition. Blackwell Science
3.	Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson
	Web Resources
1.	https://www.nationalgeographic.com/animals/invertebrates/
2.	https://bit.ly/3kABzKa
3.	https://www.nio.org/

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong (3) M-Medium (2) L-Low (1) B

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SEMESTER - II

Course Code CC3	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
T2ZO3	CHORDATA	Core	Y	-	-	-	4	4	25	75	100

Learning Objectives	
CO1	To understand the structures and distinct features of Phylum Chordata.
CO2	To understand and able to distinguish the characteristic features of each subphylum and class.
CO3	To understand the economic importance of vertebrates
CO4	To know about the adaptations of vertebrates
CO5	To understand the evolutionary position of different groups of vertebrates

UNIT	Details	No. of Hours	Course Objectives
I	**General Characters and Classification of Phylum Chordata**: Origin of Chordata, Differences between non-chordates and chordates, General characters, Affinities and Systematic position of Hemichordata (*Balanoglossus*), Urochordata (*Ascidia*), Cephalochordata (*Amphioxus*).	12	CO1 CO2
II	**Prochordates and Agnatha**: Characteristics of subphylum vertebrata, Classification of Vertebrata upto Class level, Agnatha (*Petromyzon*), - Pisces (*Scoliodon sorrakowah*) General characters and classification, Origin of fishes, Affinities of Dipnoi - Types of scales and fins - Accessory respiratory organs - Air bladder - Parental care - Migration - Economic importance.	12	CO1 CO2 CO4 CO5
III	**Amphibia**: General characters and classification - Origin of Amphibia - Type study - *Rana hexadactyla* - Adaptive features of Anura, Urodela and Apoda - Neoteny in Urodela - Parental care in Amphibia.	12	CO1 CO2 CO3 CO4, CO5
IV	**Reptilia**: General characters and classification - Type study – (*Calotes versicolor (endoskeleton of Varanus*) - Origin of reptiles and effects of terrestrialisation, Extinct reptiles. Snakes of India. Poison apparatus and biting mechanism of poisonous snakes - Skull in reptiles as basis of classification	12	CO1 CO2 CO4 CO5

V	**Aves and Mammalia:** Ayes: General characters and classification – Type study - *Columba livia* - Origin of birds, Flight adaptations, Migration. Mammalia: General characters and classification - Type study - Rabbit - Adaptive radiation in mammals - Egg laying mammals, Marsupials, Flying mammals, Aquatic mammals, Dentition in mammals.	12	CO1 CO2 CO4 CO5
	Total	**60**	

Course Outcomes		
CO	On completion of this course, students will;	
CO1	Classify, Identify and recall the name and distinct features of different subphylum belonging to phylum Chordata.	PO1
CO2	Explain, and relate the origin, structural organization and evolutionary aspects of vertebrates.	PO1 PO2
CO3	Analyze, compare and distinguish the developmental stages and describe the important biological process.	PO3, PO4, PO5
CO4	Correlate the different modes of life and parental care among different vertebrates.	PO3, PO5, PO6
CO5	Summarise the morphology and ecological adaptations in vertebrates and list out the economic importance.	PO2, PO3, PO5, PO8

Text Books (Latest Editions)	
1.	Ayyar, E.K. and T.N. Ananthakrishnan, 1992. Manual of Zoology Vol. II (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 891p.
2.	Jordan, E.K. and P.S. Verma, 1995. Chordate Zoology and Elements of Animal Physiology, 10th edition, S. Chand & Co Ltd., Ram Nagar, New Delhi, 1151 pp.
3.	Nigam, H.C., 1983. Zoology of Chordates, Vishal Publications, Jalandhar - 144008, 942.
4.	Ganguly, Sinha, Bharati Goswami and Adhikari, 2004. Biology of animals Vol.II - New central book Agency (p) Ltd.
5.	Kotpal. R.L. A, Modern text book of Zoology Vertebrates- Rastogi publications. 2009

References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1.	Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub. Co.
2.	Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.
3.	Hickman, C.P. Jr., F.M.Hickman and L.S. Roberts, 1984. Integrated Principles of Zoology, 7th Edition, Times Merror/Mosby College Publication. St. Louis. 1065 pp.
4.	Newman, H.H., 1981. The Phylum Chordata, Satish Book Enterprise, Agra – 282 003, 477
5.	Parker and Haswell, 1964. Text Book of Zoology, Vol II (Chordata), A.Z.T, B.S. Publishers and Distributors, New Delhi - 110 051, 952 pp.
6.	Pough H. Vertebrate life, VIII Edition, Pearson International.

7.	Waterman, Allyn J. et al., 1971. Chordate Structure and Function, Mac Millan &Co., New York, 587 pp.
8.	Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

Web Resources	
1.	http://tolweb.org/Chordata/2499
2.	https://www.nhm.ac.uk/
3.	https://bit.ly/3Av1Ejg
4.	https://bit.ly/3kqTfYz
5.	https://biologyeducare.com/aves/
6.	https://www.vedantu.com/biology/mammalia

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3		S	S	S	S	S		S
CO 4			S	S	S	M		
CO 5			S		S			S

S-Strong (3) M-Medium (2) L-Low (1)

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SEMESTER - II

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
T2ZO4	CHORDATA LAB COURSE	Core	Y	-	-	-	4	4	25	75	100

Learning Objectives	
CO1	To understand the structures and distinct features of phylum chordata.
CO2	To understand and able to distinguish the characteristic features of each subphylum and class.
CO3	To understand and compare the structure of various internal organs in different classes of vertebrates.
CO4	To know about the classification, adaptations and affinities of chordate animals.

UNIT	Details	No. of Hours	Course Objectives
I	**Dissections**:Frog (Demo)/Fish:Externalfeatures,Digestivesystem, Arterialsystem,Venoussystem,5^{th}Cranialnerve,9^{th}and10^{th}cranial nerves, Male and female urinogenital system.	12	CO1
II	**Mounting**: Fish: Placoid and Ctenoid scales. Frog: Hyoid apparatus and Brain (Demo).	12	CO2
III	**Osteology**:Frog:Skullandlowerjaw,Vertebralcolumn,Pectoral girdle,Pelvicgirdle,Forelimb,Hindlimb.Chelonia-Anapsidskull,Pigeon - skull and lower jaw, synsacrum.	12	CO3
IV	**SpecimenandSlides**:**(i) Hemichordata:** Balanoglossus, Tornaria larva **(ii). Protochordata:** Amphioxus. Amphioxus T.S. through pharynx **(iii). Cyclostomata:** Petromyzon, Myxine, Ammocoetus larva **(iv). Pisces:** Sphyrna Pristis, Torpedo, Channa, Pleuronectes, Hippocampus, Exocoetus, Echieneis, Labeo, Catla, Clarius, Auguilla, Protopterus, Scales: Placoid, Cycloid, Ctenoid **(v). Amphibia:** Ichthyophis, Amblystoma, Siren, Hyla, Rachophous,Bufo,Rana, Axolotal larva **(vi). Reptilia:** Draco, Chemaeleon, Gecko, Uromastix, Vipera russelli, Naja, Bungarus, Enhydrina, Typhlops, Testudo, Trionyx, Crocodilus, Ptyas. **(vii). Aves:** Archaeopteryx, Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo; Collection and study of different types of feathers: Quill, Contour, Filoplume, down **(viii). Mammalia:** Ornithorhynchus,	12	CO4

	Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog		
V	**Embryology**: Stages in the development of Amphioxus, Frog and Chick- Placenta in shark and mammals.	12	CO5
	Total	60	

Course Outcomes		
COs	On completion of this course, students will;	
CO1	Identify and recall the name and distinct external and internal features of animals belonging to phylum Chordata.	PO1
CO2	Explain the structural organization of various organs and systems in different classes of vertebrates.	PO1, PO2
CO3	Analyse, compare and distinguish the morphological features and developmental stages of chordates	PO4, PO6
CO4	Dissect and explain various organs and internal systems in different vertebrates and correlate its function.	PO4, PO5, PO6
CO5	Summarise the morphology and ecological adaptations in vertebrates and list out the economic importance.	PO3, PO8

Text Books (Latest Editions)	
1.	Lal S S, 2009. Practical Zoology Vertebrate, Rajpal and Sons Publishing, 484pp.
2.	VermaP.S, 2000. A Manual of Practical Zoology. Chordates, S. Chand Limited, 627pp.

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Robert William Hegner, 2015. Practical Zoology, Biblio Life, 522pp.
2.	Young, J, Z., 1972. The life of vertebrates. Oxford Uni. London.

Web Resources	
1.	https://www.youtube.com/watch?v=b04hc_kOY10
2.	https://bit.ly/3CzTEy8
3.	http://tolweb.org/Chordata/2499
4.	https://www.nhm.ac.uk/
5.	https://bit.ly/3Av1Ejg

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions

Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong (3) **M-Medium (2)** **L-Low (1)**

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SEMESTER - II

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
T2ZOSE2	WILDLIFE CONSERVATION AND MANAGEMENT	SEC2	Y	-	-	-	2	2	25	75	100

Learning Objectives

1. To understand and discuss the importance of wildlife, its values, modern concepts in wildlife management, and relevant conservation policies.
2. To assess and instil strong foundations on wildlife policies and be familiar with a variety of laws and regulations.
3. To analyse and design appropriate approaches to turn conflict into tolerance and coexistence, with an emphasis on the human dimensions of human-wildlife interactions.
4. To evaluate and integrate all the related areas like Fundamentals in Ecology, Forestry, Natural Resource Conservation approaches and develop the role PVA models for protection of Endangered species.
5. To explain the advanced scientific basis for wildlife management and discuss National and International Efforts for successful wildlife conservation.

Unit I: Biodiversity Extinction and Conservation Approaches:
Perspectives and Expressions. Identification and prioritization of Ecologically sensitive area (ESA). Coarse filter and fine filter approaches. Regional and National approaches for biodiversity conservation.

Unit II: Theory and Analysis of Conservation of Populations:
Stochastic perturbations - Environmental, Demographic, spatial and genetic stochasticity. Population viability analysis-conceptual foundation, uses of PVA models. Management Decisions for small populations using PVA models. Minimum viable populations & recovery strategies for threatened species.

Unit III: National and International Efforts for Conservation:
International agreements for conserving marine life, Convention on wetlands of International Importance (Ramsar convention). Conservation of Natural Resources. Overview of conservation of Forest &Grassland resources. CITES, IUCN, CBD National Forest Policy, 1988, National Wildlife Action Plan 2017-2031, Wildlife Protection Act 1972, National and State Biodiversity Action Plans and other Forests and Environmental Acts.

Unit IV: Wildlife in India: Wildlife wealth of India & threatened wildlife, Reasons for wildlife depletion in India, Wildlife conservation approaches and limitations. Wild life Habitat: Characteristic, Fauna and Adaptation with special reference to Tropical Forest. Protected Area concept: National Parks, Sanctuaries and Biosphere Reserves, cores and Buffers, Nodes and corridors. Community Reserve and conservation Reserves.

Unit V: Management of Wildlife: Distribution, status. Habitat utilization pattern, threats to survival of Slender Loris, Musk deer, Great Indian Bustard, Olive Ridley turtle. Wild life Trade & legislation, Assessment, documentation, Prevention of trade, Wild life laws and ethics.

Text Books:

1. Robinson W L and Eric G Bolen, 1984. Wildlife Ecology and Management, Maximillan Publishing Company, New York, p 478.
2. Aaron, N.M.1973 Wildlife ecology, W.H. Freeman Co. San Francisco, U.S.A.
3. Dasmann R F, 1964. Wildlife Biology, John Wiley & Sons, New York, p 231.
4. Justice Kuldip Singh 1998. Handbook of Environment, Forest and Wildlife Protection Laws in India, Natraj Publishers, Dehradun.
5. Hosetti, B.B. 1997 Concepts in Wildlife Management, Daya Publishing House, Delhi.
6. Sutherland, W.J 2000. The conservation handbook: Research, Management and Policy. Blackwell Science.
7. Caughley.G and Sinclaire, A.R.E 1994 Wildlife ecology and management. Blackwell Science.
8. Woodroffe R, Thirgood, S. and Rabinowitz A. 2005.People and Wildlife, Conflict or Co exsistence? Cambridge University.
9. Sinha, P.C. 1998. Wildlife and Forest Conservation, Anmol Publishing Pvt. Ltd., New Delhi.
10. Singh, S.K, 2005. Text Book of Wildlife Management. IBDC, Lucknow.

Suggested Readings

1. Gilas R H Jr.(ed.), 1984. Wildlife Management Techniques, 3rd ed. The Wildlife Society, Washington D.C., Nataraj Publishers, Dehra Dun, p 547.
2. Rodgers W A, 1991. Techniques for Wildlife Census in India - A Field Manual: Technical Manual - T M - 2. WII.
3. Saharia V B, 1982. Wildlife of India, Natraj Publishers, Dehra Dun.
4. Goutam Kumar Saha and Subhendu Mazumdar, 2017. Wildlife Biology: An Indian Prospective, PHI Publisher, Delhi.
5. Katwal/Banerjee, 2002. Biodiversity conservation in managed and protected areas, Agrobios, India.
6. Gopal, Rajesh,1992. Fundamentals of Wildlife Management, Justice Home, Allahabad, India.
7. Sharma, B.D, 1999. Indian Wildlife Resources Ecology and Development, Daya Publishing House, Delhi.

8. Stephen, H.B. and V.B. Saharia,1995. Wildlife research and management. Asian and American Approaches, Oxford University Press, Delhi.
9. Negi, S.S. 1993. Biodiversity and its conservation in India, Indus Publishing Co., New Delhi.
10. Moulton, M. P. & J. Sanderson, 1997. Wildlife Issues in a Changing World. St. Lucie Press.

Web resources

1. https://bit.ly/39oPj44
2. https://bit.ly/3lHdEYJ
3. https://bit.ly/3CwBCfY
4. https://bit.ly/3EDYr3a
5. https://bit.ly/3tVtG4U

Course outcomes (COs)

1. To understand and recall the importance of wildlife, extinction and Conservation Approaches of wildlife.
2. To integrate and assess the National, international approaches for biodiversity conservation.
3. To analyse and differentiate threats to wildlife, various action plans, conservation strategies on wildlife of India to turn conflict into tolerance and coexistence.
4. To explain the role PVA models, Wildlife conservation approaches, and limitations.
5. To construct and simulate National and International strategies for Conservation, Wild life laws and ethics.

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SEMESTER - II

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	Ext.	Total
T2ZOSE3	AQUARIUM KEEPING	SEC3	Y	-	-	-	2	2	25	75	100

Learning Objectives

- To create knowledge on self-employment opportunity of ornamental fishes
- To provide the knowledge of ornamental fishes and their equipment
- To understand the different breeding techniques of ornamental fishes

UNIT I

Introduction and scope - Aquarium fish keeping as hobby and cottage industry. Commercial aspects like national and international market. To create knowledge on self-employment opportunity.

UNIT II

External morphology of a typical fish. Exotic and endemic varieties of ornamental fishes.

UNIT III

Aquarium preparation and maintenance - Kinds of tanks, tank setting, biological filter and aeration, water management, planting, lighting and feeds. Budget for setting up an Aquarium Fish Farm as a Cottage Industry

UNIT IV

Live fish transport- handling, feeding and forwarding techniques of fish. Fish Diseases and their control.

UNIT V

Breeding – Common characters and sexual dimorphism of Fresh water and Marine aquarium ornamental fish varieties such as Guppies, Mollies, Sword tails, Platy, Siamese fighters and Gold fish, Butterfly fish, blue morph and Anemone fish.

REFERENCE BOOKS:

1. Santhanam, P., Sukumaran, N. & P. Natarajan, A manual of freshwater aquaculture (1987), Reprint 1999, Oxford & IBH Publishing Company Pt., Ltd., New Delhi.
2. Cliff Harrison, A colour guide to Tropical Fish (1980), Chartwell Books, INC, Cerkshire, printed in Hon Kong.
3. O'Connell, R. F., The freshwater aquarium (1977), Arco Publishing Company, INC New York.
4. JingranV.G., 1991: Fish and Fisheries in India – Hindustan Publ.co. New Delhi
5. Mill Dick, 1993: Aquarium Fish, Daya Pub.co., New Delhi

Course Outcome:

- Students to learn about different ornamental fishes and identify the diseases of them
- To develop entrepreneur potential in the field of aquarium and get self employment.

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SEMESTER – I

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
~~A1AZ1~~ T2G201	**Genera Zoology I**	Core	Y	-	-	-	4	4	25	75	100

Learning Objectives			
CO1	To acquire a basic knowledge of diversity and organization of Protozoa, Coelenterata, Helminthes and Annelida		
CO2	To acquire a basic knowledge of diversity and organization of Arthropoda, Mollusca and Echinodermata		
CO3	To comprehend the taxonomic position and diversity among Protochordata, Pisces and Amphibia		
CO4	To comprehend the taxonomic position and diversity among Reptilia, Aves and Mammalia		
CO5	To acquire detailed knowledge of select invertebrate and chordate forms		
UNIT	**Details**	**No. of Hours**	**CO**
I	**Diversity of Invertebrates I:** Principles of taxonomy. Criteria for classification–Symmetry and Coelom–Binomial nomenclature. Classification of Protozoa, Coelenterata, Helminthes and Annelida up to classes with two examples.	12	CO1
II	**Diversity of Invertebrates II:** Classification of Arthropoda, Mollusca and Echinodermata up to class level with examples.	12	CO2
III	**Diversity of Chordates I:** Classification of Prochordata, Pisces and Amphibia up to orders giving two examples	12	CO3
IV	**Diversity of Chordates II:** Classification of Reptilia, Aves and Mammalia upto orders giving two examples.	12	CO4
V	**Animal organization:** Structure and organization of Earthworm, Rabbit/Rat, Prawn/Fish	12	CO5
	Total	**60**	

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Recall the characteristic features invertebrates and chordates.	PO1
CO2	Classify invertebrates up to class level and chordates up to order level	PO1, PO2
CO3	Explain and discuss the structural and functional organisation of some invertebrates and chordates	PO4, PO6
CO4	Relate the adaptations and habits of animals to their habitat	PO4, PO5, PO6
CO5	Analyse the taxonomic position of animals.	PO3, PO8

Text Books	
1.	Ekambaranatha Iyer, -Outlines of Zoology. Viswanathan Publication

References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Ekambaranatha Iyar and T. N. Anandakrishnan - A Manual
2.	Ekambaranathalyar and T.N. Ananthakrishnan, -A Manual of Zoology-Invertebrate– Vol II: V iswanathan Publishors.
3.	Ekambaranathalyar and T.N. Ananthakrishnan, -A Manual of Zoology: Chordata Viswanathan Publishers.
4.	Jordan E.L. and P.S. Verma-Invertebrate Zoology, S. Chand&Co.
Web Resources	
1.	www.sanctuaryasia.com
2.	www.iaszoology.com

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions
Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, short summary or overview
Application (K3)	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong (3) **M-Medium (2)** **L-Low (1)**

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T2GZ03

SEMESTER – II

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
~~A1AZ2~~ T2GZ03	General Zoology II	Core	Y	-	-	-	4	4	25	75	100

Learning Objectives	
CO1	To enable students to learn basic concepts relating to aspects of respiratory, circulatory, excretory nervous and sensory physiology.
CO2	To enable students to comprehend the processes involved during development
CO3	To enable students to learn basic concepts of immunity and the working of immune organs and familiarize them with the recommended vaccination schedule
CO4	To enable students to comprehend the basic concepts of human genetics and patterns of inheritance
CO5	To enable students to learn about aspects of animal behaviour such as foraging, courtship, nest construction, parental care and learning

UNIT	Details	No. of Hours	CO
I	Respiration- Respiratory pigments and transport of gases. Mechanism of blood clotting. Types of excretory products–Ornithine cycle. Structure of neuron–Conduction of nerve impulse, Mechanism of vision and hearing.	12	CO1
II	Fertilization, cleavage, Gastrulation and Organogenesis of Frog; Placentation in mammals	12	CO2
III	Innate and Acquired - Active and Passive; Antigens and Antibodies; Immunological organs–responses in humans; Vaccination schedule	12	CO3
IV	Human Genetics: Human Chromosomes – Sex Determination in Humans; Patterns of Inheritance: Autosomal Dominant, Autosomal Recessive, X-linked , Y-linked, Mitochondrial, Multiple Allelic and Polygenic; Genetic Counselling	12	CO4
V	Animal Behaviour: Foraging, Courtship Behaviour, Shelter and Nest Construction, Parental Care, Learning Behaviour	12	CO5
	Total	**60**	

Course Outcomes		
Course Outcomes	On completion of this course, students will:	
CO1	Recall the parts and working of body organs and developmental stages, name the patterns of inheritance and list different types of animal behaviour	PO1
CO2	Analyse the different developmental stages	PO1, PO2
CO3	Analyse the working of body and immune systems	PO4, PO6
CO4	Analyse the different patterns of inheritance	PO4, PO5, PO6
CO5	Relate the behaviour of animals to physiology. Analyse the different types of behaviour	PO3, PO8

Text Books (Latest Editions)

1.	Verma P.S. & Agarwal - Developmental Biology, Chordata embryology S. Chand & Co.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Owen, J. A., Punt, J. & Stranford, S. A. - Kuby Immunology. New York: W.H. Freeman & Company
2.	Klug, W. S., Cummings, M. R. & Spencer, C - Concepts of Genetics. (12th ed.). New Jersey: Pearson Education
3.	Mathur, R.- Animal Behaviour. Meerut: Rastogi.
4.	Verma P.S. & Agarwal- Developmental Biology, Chordata embryology S. Chand & Co.
Web Resources	
1.	Continuous Internal Assessment Test
2.	Assignments
3.	Seminars
4.	Attendance and Class Participation
5.	End Semester Examination

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Simple definitions, MCQ, Recall steps, Concept definitions	
	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
External Evaluation	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge	75 Marks
	Longer essay/ Evaluation essay, Critique or justify with pros and cons	100 Marks

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong (3) **M-Medium (2)** **L-Low (1)**

HEAD
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Rajah Serfoji Govt. College (Auto),
THANJAVUR - 613 005.

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ZOOLOGY PRACTICAL (for students admitted from the academic year 2022-2023)							
Credit	3	Hours/Week	2	Sub Code	~~A1AZ3~~ T2GZ02P	Semester	II
Medium of Instruction: English/Tamil						AC 3	

Course Outcomes:

CO No	CO-Statement	Cognitive Level (K Level)
On successful completion of this course, students will be able to:		
CO1	Learn practical knowledge of certain selected functional systems on invertebrates and chordates and physiological changes	**K1**
CO2	Gain experience on standard mounting procedures of harmful and	**K2**
CO3	Familiarize and acquire basic knowledge on entire morphology of various invertebrate and chordate animals of the given (syllabus)families.	**K3**

Major Practical: Dissections:

Earthworm: Digestive system and Nervous system.
Cockroach: Digestive system and Nervous system
Frog: Pro-dissector software

Demonstration

Determination of Haemoglobin
Identification of blood grouping

Minor Practical:

Earthworm: Body setae, Penial setae.
Honey bee: Mouth Parts
Shark: Placoid scale.
Determination of pH
Red blood cell smear preparation

Spotters:

Invertabrates:
Entamoeba, Euglena, Obelia colony, Aurelia entire, Fasciola hepatica (W.M & T.S.), Taeniasolium- entire and scolex, Ascaris - male and female, Earthworm, Leech, Freshwater mussel, Starfish,
Interlinks: Amphioxus, Balanoglossus, Ascidian
Chordates: Sucker fish, Frog, Calotes, snakes, Rat and bat.
Physiology: Nerve cell, connective tissue, eye, nephron, RBC and WBC
Embryology: sperm cell, ovum cell, Frog 1st stage cleavage, blastula, Gastrula
Immunology:
Primary Lymphoid organ, secondary lymphoid organs

Genetics:

Human karyotype

Field visit:

Aquaculture, Ornamental and Poultry farm, Vermiculture Places

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	S							
CO 2	M	S						
CO 3				S		S		
CO 4				S	S	M		
CO 5			S					S

S-Strong (3) **M-Medium (2)** **L-Low (1)**

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