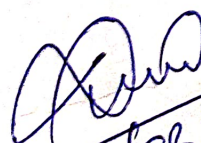


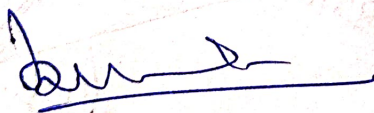
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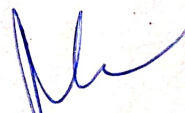
Reaccredited 'A++' Grade by NAAC(CGPA:3.58/4.00)  
College with Potential for Excellence by UGC  
DST-FIST Supported & STAR College Scheme by DBT


## Theory Syllabus


Part A- Introduction			
Program: Diploma		Class: B.Sc.	Semester: III
		Session: 2025-26	
Subject: Zoology			
1	Course Code	S2-ZOOL1T	
2	Course Title	Diversity of Chordates and Comparative Anatomy	
3	Course Type	Core Course- Elective	
4	Pre-requisite (if any)	To study this course, a student must have had the subject Zoology in class B.Sc. III Sem	
5	Course Learning outcomes (CLO)	After completion of the course the students will able to: 1. Understand chordate diversity of animals and their taxonomic positions. 2. Identify the morphological and anatomical features and basis of chordate classification. 3. Know economic importance and present status that will develop positive attitude towards conservation of biodiversity. 4. Differentiate the organism belonging to different taxa, by studying comparative anatomy. 5. The project, assignment will give them a flavor of research in studying biodiversity, taxonomy besides improving their writing skills and lay foundation of career in Zoology.	
6	Credit Value	3	
7	Total Marks:	Max. Marks: 60+40	Min. Passing Marks:35

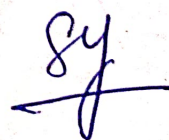
  
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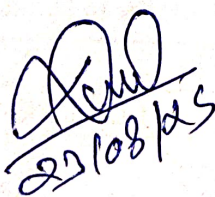
  
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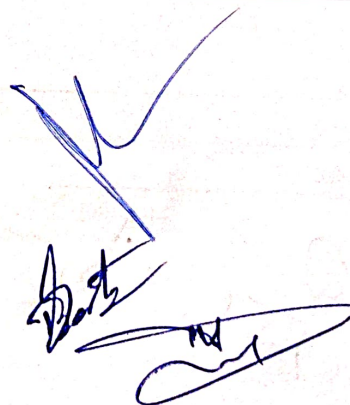
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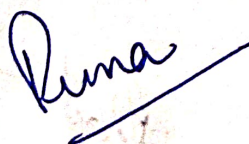
Part B – Content of the course		
Total No of lectures-Tutorials-Practical: 02 hours per week LTP-		
No. of Lectures = 45		
Unit	Topics	No. of Lectures
I	<b>1. Introduction to Chordates</b> 1.1 Traditional Knowledge on Animal Science in ancient Indian Civilization 1.2 Origin of Chordates, General characteristics and outline classification of Phylum Chordata up to orders according to Parker and Haswell, Seventh Edition <b>2. Protochordata</b> 2.1 General characteristics and classification of Sub- Phylum Urochordata and Cephalochordata. 2.2 Type study of Herdmania and retrogressive metamorphosis in ascidian tadpole. 2.3 Type study of Amphioxus and its Affinities. <b>3. Agnatha</b> 3.1 Comparison of Petromyzon and Myxine. <b>Keywords/Tags:</b> Chordata, Herdmania, Amphioxus, Cephalochordata, Petromyzon.	12
II	<b>1. Pisces</b> 1.1. General characteristics and classification of Pisces. 1.2. Accessory respiratory organs, Parental care in fishes. <b>2. Amphibia</b> 2.1 General characteristics and classification of Amphibia. 2.2 Parental Care in Amphibia and Paedomorphosis <b>3. Reptilia</b> 3.1. General Characteristics and classification of Reptilia. 3.2. Difference between Poisonous and Non-Poisonous snakes, Venom and Antivenom 3.3. Poison apparatus and biting mechanism in snake. <b>Keywords/Tags:</b> Pisces, Parental care, Amphibia, Reptiles, Poison apparatus.	12



  
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III	<p><b>1. Aves</b></p> <p>1.1 Brief Introduction of "Birdman" of India - Dr. Salim Ali</p> <p>1.2 General characteristics and classification of Aves.</p> <p>1.3 Migration of birds, principles and aerodynamics of flight.</p> <p>1.4 Flight adaptation in birds.</p> <p><b>2. Mammalia</b></p> <p>2.1 General characteristics and classification of mammals.</p> <p>2.2 Adaptive radiation in mammals with reference to locomotory appendages.</p> <p>2.3 Introduction of ZSI (Zoological Survey of India)</p> <p><b>Keywords/Tags:</b> Aves, Aerodynamics, Flight Adaptation, Mammalia, Adaptive Radiation, Locomotory Appendages.</p>	9
IV	<p><b>Comparative Anatomy of Vertebrates.</b></p> <p>1. Comparative study of integument and its derivatives of Vertebrates.</p> <p>2. Comparative study of appendicular skeleton (Limb and girdles) of Vertebrates.</p> <p>3. Comparative study of digestive system of Vertebrates.</p> <p>4. Comparative study of respiratory system of Vertebrates</p> <p><b>Comparative Anatomy of Vertebrates.</b></p> <p>1. Comparative study of aortic arches and heart of Vertebrates.</p> <p>2. Comparative study of Brain of Vertebrates.</p> <p>3. Comparative study of Urinogenital System of Vertebrates</p> <p>4. Study of Eye and Ear of mammals</p> <p><b>Keywords/Tags:</b> Integument, Derivatives, Girdles, Digestive System, Respiratory System. Heart, Brain, Kidney, Urinogenital System, Eye, Ear.</p>	11

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**Suggested Readings:**

1. Dhama, P.S., and Dhama, J.K. "Chordate Zoology" R.Chand & Co.(2006)
2. Young J.Z. "The Life of Vertebrates. III Edition", Oxford University Press. (2004)
3. Parker T.J. & Haswell, W.A., "Textbook of Zoology- Vertebrates", VII Edition, Volume II. (1972)
4. Hyman, L.H. "Hyman's Comparative Vertebrate Anatomy" Third Edition, Univ. of Chicago Press, Chicago & London
5. Kent, G.C., Cart R.K., "Comparative Anatomy of the Vertebrates" 9<sup>th</sup> Edition, McGraw Hill, Boston, USA. (2015).
6. Jordan and Verma; "Chordate Zoology". Revised & enlarged edition, S. Chand & Co. (1965)
7. Jordan E.L., "Chordate Zoology" S. Chand & Co., New Delhi (2009 reprint),
8. Kotpal, R.L. "Modern Textbook of Zoology- Vertebrates", Rastogi Publications, Meerut (2000)
9. Tortora, G.J. & Derrickson, B.H. "Principles of Anatomy & Physiology", Global Edition, John Willey & Sons, Inc. (2017)
10. Kotpal, R.L. "Chordate and Comparative Anatomy" Edition-I, Rastogi Publications, Meerut (2017).
11. Sinha A.K., Adhikari S., Ganguly B.B "Biology of Animals" Vol II, New Central Book Agency, Calcutta (2012).
12. Deoras, P.J., "Snakes of India" National Book Trust of India, (1981)
13. Kotpal, R.L., Shastri. Shukla. "Comparative Anatomy and Developmental Biology", Edition-I, Rastogi Publications, Meerut (2019).
14. Banerjee, Ananda., "Common Birds of the Indian Subcontinent" A field Guide, II Edition, Rupa & Co., New Delhi (2008).
15. Ali, Salim., "The Book of Indian Birds", 12th Edition, Bombay Natural History Society, Mumbai (1968)
16. kulshreshtha, S.K., "Comparative Anatomy of Vertebrates", II revised Edition, Anmol Publications Pvt Ltd, New Delhi, 2004
17. जैकब डेनिस, शर्मा आशा, नंदचहल कुमकुम, "कोर्डेटा, संरचना एवं उद्विकास", रमेश बुक डिपो, जयपुर
18. कोटपाल, आर.एल., "कशेरुकी प्राणी विज्ञान" रस्तोगी पब्लिकेशंस, मेरठ (2018)
19. शर्मा, डा. आशा, कौशिक, राजेंद्र, "कोर्डेटा, संरचना व कार्य" रमेश बुक डिपो, जयपुर
20. Books Published by MP Hindi Granth Academy, Bhopal

**2. Suggestive digital platforms web links.**

1. <https://opentextbc.ca/biology2eopenstax/chapter/chordates/>
2. SWAYAM (functional anatomy and regulation of vision, hearing, taste, smell and touch.  
Link - [https://www.swayamprabha.gov.in/index.php/program/current\\_he/9](https://www.swayamprabha.gov.in/index.php/program/current_he/9)

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3. [www.prodissector.com](http://www.prodissector.com)
4. <http://www.ignouhelp.in/ignou-lse-10-study-material/>
5. <https://animaldiversity.org/site/accounts/information/Chordata.html>
6. <https://www.mphindigranthacademy.org/>

**Suggested equivalent online courses:**

SWAYAM (Chordates) Link

1. <https://www.youtube.com/embed/M2uE0CW83NE>
2. <https://www.youtube.com/embed/tFy9D5Eo-dc>
3. <https://www.youtube.com/embed/gqIKPQCtNcQ>

**Part D-Assessment and Evaluation**

**Suggested Continuous Evaluation Methods:**

Maximum Marks : 100

Continuous Comprehensive Evaluation (CCE) : 40 marks University Exam (UE) : 60 marks

Internal Assessment : Continuous Comprehensive Evaluation (CCE): 40	Class Test Assignment/Presentation	Total - 40
External Assessment : University Exam Section: 60 Time : 03.00 Hours	Section(A) : Objective Type Question Section(B) : Short Question Section(C) : Long Questions	Total 60

Any remarks/suggestions:

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## Practical Syllabus

### Part A- Introduction

Program: Diploma	Class: B.Sc.	Semester: III	Session: 2025-26
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### Subject: Zoology

1	Course Code	S2-ZOOLIP
2	Course Title	Chordate Zoology
3	Course Type (Core)	Core Course-Elective
4	Pre-requisite (if any)	To study this course, a student must have bad studied the subject Zoology in class B.Sc. III Sem.
5	Course Learning outcomes (CLO)	<p>On completion of this course, learners Will be able</p> <ol style="list-style-type: none"> <li>1. Identify diversity of chordates, basics of systematics and hierarchy of different categories.</li> <li>2. Learn characteristics of different classes of vertebrates through studying examples (preserved specimens)</li> <li>3. Gain training experience in anatomy by learning dissection and mounting.</li> <li>4. Get knowledge how vertebrate organs differ from class to class by comparative study of Osteology and histology.</li> <li>5. Develop flow of research and skills of writing by submitting project report and assignment.</li> </ol>
6	Credit Value	1
7	Total Marks	Max. Marks: 60+40 . Min. Passing Marks:35

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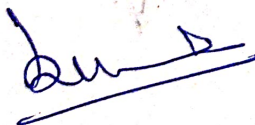
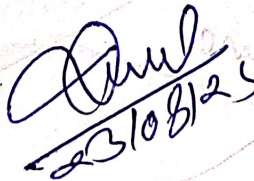
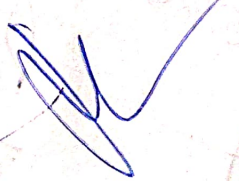

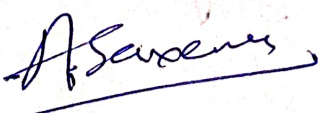

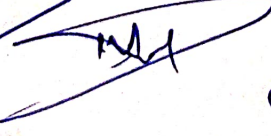

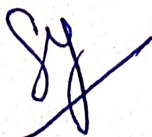
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Part B – Content of the course			L-T-P:
Total No. of Lectures-Tutorials-Practical: 2 hour per week No. of Lectures = 30			
Unit	Topics	No. of Lectures	
I	Study of museum specimens 1. Protochordata: Herdmania, Amphioxus 2. Fishes: Scoliodon, Stegostoma, Torpedo, Heteropneustes, Labeo, Exocoetus, Hippocampus, Anabas, Eel, Flat fish. 3. Amphibia : Necturus, Bufo , Rana, Salamander, Hyla, Axolotl larva, Mid Wife Toad, Ichthyophis 4. Reptilia : Chelone, Trionyx, Hemidactylus, Varanus, Chameleon, Draco, Viper, Raja, Hydrophis. 5. Aves : Local Birds, Vulture, Great Indian Bustard, Lesser Florican 6. Mammalia : Bat, Funambulus, Platypus, Rat,	6	
II	Study of Histological slides - T.S. of Duodenum, Stomach, Small Intestine, Liver, Pancreas, Testis, Ovary, V.S. of skin, L.S. of Kidney of vertebrates	2	
III	Osteology - Study of Limb Bones and Girdles of Vertebrates (Amphibia, Reptilia, Aves, Mammalia).	3	
IV	Study of different types of feathers/ beaks of birds.	2	
V	Dissection of Local fish (Only demonstration of commercially available local fish / Through computer simulation method/through You tube videos / through models and charts. a) General Viscera, Arterial System b) Cranial nerves V, VII, IX and X	8	
VI	Mounting of scales of fishes	2	
VII	Comparative study of heart and brain of vertebrates	2	
VIII	Study of local bird fauna of surrounding area (College campus/ Village/ Garden/ Ward)	3	
VIX	Collection	2	
Keywords/Tags: Protochordates, Duodenum, Girdles, Feathers, Cranial nerves, Brain, Birds			



### Part C – Learning Resources

#### Text Books, Reference Books, Other resources

##### Suggested Readings:

1. Lal, S.S., "Vertebrate Practical Zoology", 11 Revised edition, Rastogi publications, Meerut (2009).
2. Sharma, Vijay Laxmi., "Practical Zoology", Paragon industrial publication (2004)
3. Verma P.S., "Manual of Practical Zoology — Chordates", S. Chand Co. Ltd. 11<sup>th</sup> Edition (2010).
4. Prakash, M., & Arora, C.K., "Laboratory animals", Anmol Publications, New Delhi (1998).
5. Yadav & Varshney, " Practical Zoology", Kedarnath Ramnath (2015).
6. लाल, एस. एस. "प्रयोगात्मक प्राणी विज्ञान – कशेरुकी" रस्तोगी प्रकाशन, मेरठ
7. अंसारी एस. एस., डॉक्टर कोहली, के., जैन, नरेंद्र, भाटिया, ए. एल., "प्रायोगिक प्राणी विज्ञान" आर. बी. डी. पब्लिकेशन

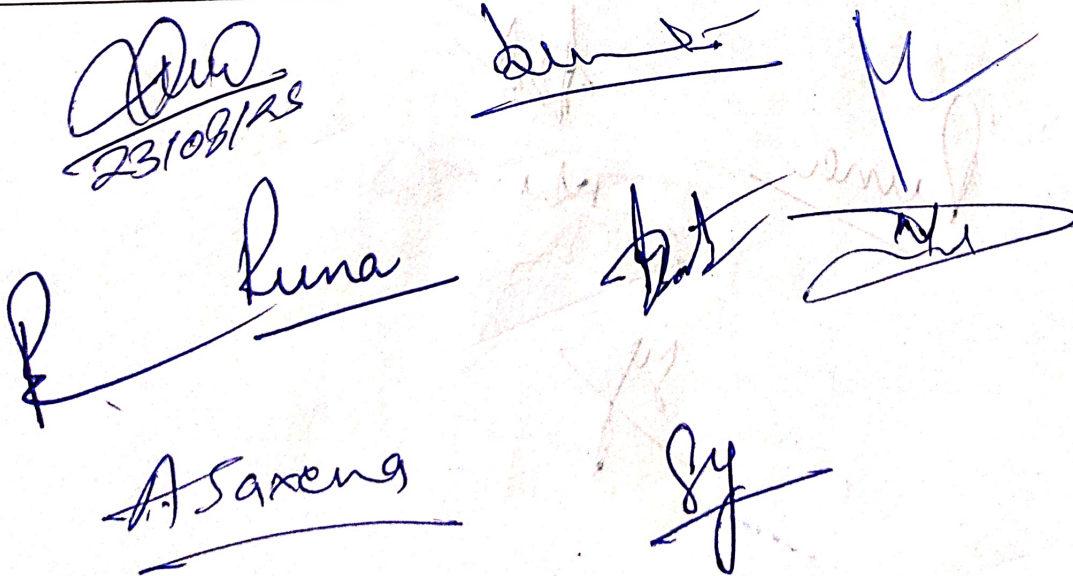
8. Books Published by MP Hindi Granth Academy, Bhopal.

##### Suggestive digital platforms web links

(Virtual Dissection)

2. <https://en.wikipedia.org/wiki/Chordate>
3. <https://www.youtube.com/watch?v=BBfdzpdNh70>
4. <https://www.youtube.com/watch?v=6GbJWJ3Swsc>
5. <http://www.ignotthelp.in/ignou-Ise-08-study-material-in-hindi/>
6. <https://www.mphindigranthacademy.org/>

##### Suggested equivalent online courses:

  
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## Part D- Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Internal Assessment	Marks	External Assessment	Marks
Class Interaction /Quiz	10	Viva Voce on Practical	10
Attendance	10	Practical Record File	10
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)	20	Table work / Experiments	16
		1- Spotting (museum specimens, slides and bones)	08
		2. Dissection	
		Major	
		Minor	4
		3. Mounting	
		4. Comment on comparative study (Models Charts of organs, Systems) Any two	4
		5. Identification and comment on feather / of bird (any 2- Photograph/ model/chart	4
			4
		6. Collection	
TOTAL	40		60

Any remark/Suggestions: Visit to National Park/Sanctuary/Zoo any nearby Forest area

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