ST.JOSEPH'SCOLLEGE(AUTONOMOUS)

BENGALURU-27

Re-accredited with **'A++' GRADE with 3.79/4 CGPA** by NAAC
Recognized by UGC as College of Excellence

DEPARTMENT OF ZOOLOGY

SYLLABUS FOR UNDERGRADUATE PROGRAMME

FOR THE BATCH OF 2021-2024

Part B

B.Sc. CBZ/CEZ/MCZ/CZBT/BBZ Curriculum

Courses and course completion requirements	No. of credits
General English	12
Second language: Introductory Kannada/Kannada/ Hindi/ Sanskrit/ Tamil/ Additional English/French/German.	12
Microbiology/Biotechnology/environmental science	
Chemistry/biochemistry	
Zoology	34
Open elective courses (non-professional)	
Foundation courses	
Term paper	
Soft skills (IGNITORS)	
Human resource development (HRD)/Theology	
Outreach activity	
Extra and Co-curricular activities	5

SUMMARY OF CREDITS IN ZOOLOGY

DEPARTMENT OF ZOOOLGY (UG) (2021-2024)								
Semester 1	**Code Number**	**Title**	**No. of Hours of Instructions**	**Number of Hours of teaching per week**	**Number of credits**	**Continuous Internal Assessment (CIA) Marks**	**End Semester Marks**	**Total marks**
Theory	ZO121	Diversity of Non Chordates	60	04	04	30	70	100
Practical	ZO1P1	Diversity of Non Chordates	33	03	01	15	35	50
Total Number of credits:			**05**					
Semester 2	**Code Number**	**Title**	**No. of Hours of Instructions**	**Number of teaching hrs /week**	**Number of credits**	**Continuous Internal Assessment (CIA) Marks**	**End Semester Marks**	**Total marks**
Theory	ZO221	Diversity of Chordates	60	04	04	30	70	100
Practical	ZO2P1	Diversity of Chordates	33	03	01	15	35	50
Total Number of credits:			**05**					
Semester 3	**Code Number**	**Title**	**No. of Hours of Instructions**	**Number of teaching hrs /week**	**Number of credits**	**Continuous Internal Assessment (CIA) Marks**	**End Semester Marks**	**Total marks**
Theory	ZO321	Human Anatomy and Physiology Part I	60	04	04	30	70	100
Practical	ZO3P1	Human Anatomy and Physiology Part I	33	03	01	15	35	50
Total Number of credits:			**05**					
Semester 4	**Code Number**	**Title**	**No. of Hours of Instructions**	**Number of teaching hrs /week**	**Number of credits**	**Continuous Internal Assessment (CIA) Marks**	**End Semester Marks**	**Total marks**
Theory	ZO421	Human anatomy, physiology part II and comparative anatomy	30	02	02	15	35	50
Practical	ZO4P1	Human anatomy, physiology part II and comparative anatomy	33	03	01	15	35	50
Theory	ZOOE 4121	A journey into animal world and human life	30	02	02	15	35	50

Total Number of credits:			**03**					
Semester 5	**Code Number**	**Title**	**No. of Hours of Instructions**	**Number of teaching hrs /week**	**Number of credits**	**Continuous Internal Assessment (CIA) Marks**	**End Semester Marks**	**Total marks**
Theory	ZO5121	Cell biology, Molecular biology and Immunology	45	03	03	30	70	100
Practical	ZO5P1	Cell biology, Molecular biology and Immunology	33	03	01	15	35	50
Theory	ZO5221	Ecology, wildlife and animal behavior	45	03	03	30	70	100
Practical	ZO5P2	Ecology, wildlife and animal behavior	33	03	01	15	35	50
Total Number of credits:					**08**			
Semester 6	**Code Number**	**Title**	**No. of Hours of Instructions**	**Number of teaching hrs /week**	**Number of credits**	**Continuous Internal Assessment (CIA) Marks**	**End Semester Marks**	**Total marks**
Theory	ZO6121	Hislogy, Genetics and Biotechnology	45	03	03	30	70	100
Practical	ZO6P1	Hislogy, Genetics and Biotechnology	33	03	01	15	35	50
Theory	ZO6221	Developmental biology, evolution and Zoogeography	45	03	03	30	70	100
Practical	ZO6P2	Developmental biology, evolution and Zoogeography	33	03	01	15	35	50
Total Number of credits:					**08**			

CORE COURSES (CC)	
Course Title	Code Number
Diversity of Non Chordates	ZO121
Diversity of Non Chordates	ZO1P1
Diversity of Chordates	ZO221
Diversity of Chordates	ZO2P1
Human Anatomy and Physiology Part I	ZO321
Human Anatomy and Physiology Part I	ZO3P1
Human Anatomy, Physiology Part II, and Comparative anatomy	ZO421
Human Anatomy, Physiology Part II, and Comparative anatomy	ZO4P1
Cell Biology, Molecular Biology and Immunology	ZO5121
Cell Biology, Molecular Biology and Immunology	ZO5P1
Ecology, Wildlife and Animal behaviour	ZO5221
Ecology, Wildlife and Animal behaviour	ZO5P2
Histology, Genetics and Biotechnology	ZO6121

Histology, Genetics and Biotechnology	ZO6P1
Developmental Biology, Evolution and Zoogeography	ZO6221
Developmental Biology, Evolution and Zoogeography	ZO6P2

DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE)	
Course Title	Code Number
N/A	N/A

GENERIC ELECTIVE COURSES (GSE)/ Can include open electives offered	
Course Title	Code Number
A journey into animal world and human life	ZOOE 4121

SKILL ENHANCEMENT COURSE (SEC) – Any practical oriented and software based courses offered by departments to be listed below	
Course Title	Code Number

VALUE ADDED COURSES (VAC) Certificate courses that add value to the core papers can be listed	
Course Title	Code Number
Urban Ecology and pollution abatement technologies	
Economic Zoology	
Entomology	
Introduction to Evolutionary Biology and Genetics	
Wildlife management and conservation	

Online courses offered or recommended by the department to be listed	
Course Title	Code Number

Course Outcomes and Course Content

Semester	I
Paper Code	**ZO 121**
Paper Title	**Diversity of Non-Chordates**
Number of teaching hours per week	04
Total number of teaching hours per semester	60 hours [52 hrs (theory) + 8 hrs (Self study)]
Number of credits	04

Aims and Objectives:

- **To provide students with an in-depth knowledge of diversity in form, structure and habit of Non-chordates**
- **To learn the basics of systematic Zoology and understand the hierarchy of different phyla, and its identifying characters with examples**

UNIT-I: BASICS OF SYSTEMATICS **3hrs**

1.1 Systematics, Binomial and trinomial nomenclature, International rules of Zoological nomenclature (ICZN). 1hr

1.2 Modern taxonomic methods. A brief account of the criteria employed in classification: Organization, symmetry, Germ layers, Types of coelomic cavities - Eucoelom and Pseudocoelom, Metamerism and Cephalization. 2hrs

UNIT-II: ANIMAL-LIKE PROTISTA **7hrs**

2.1 Distinguishing features and classification of Clade Protista up to phyla, with suitable examples. 1hr

2.2 Nutrition in Protists- Holozoic, holophytic, mixotrophic, saprophytic and saprozoic. 1hr

2.3 Parasitology: Parasitic protozoans in man - Occurrence, disease caused, mode 3hrs

of transmission, symptoms and preventive measures of

a) *Entamoeba histolytica* b) *Trypanosoma gambiense*
c) *Leishmania donovoni* d) *Cryptosporidium parvum*

General account and life cycle of *Plasmodium vivax*.

2.4 Reproduction in Protozoa: 1hr

Asexual reproduction – Binary fission, multiple fission, plasmotomy, budding

Sexual reproduction – Conjugation in *Paramecium caudatum* **(Self study)** 1hr

UNIT-III PORIFERA **7hrs**

3.1 Distinguishing features and classification up to classes, with suitable examples 1hr

3.2 Histology of sponges with reference to Sycon. 1hr

3.3 Skeleton in Sponges - Spicules and spongin fibres. 1hr

3.4 Canal system – Ascon, sycon and leucon types, canal system in Sycon and functions 2hrs

3.5 Reproduction - Gemmule, reduction bodies, formation of Amphiblastula larva, Parenchymula larva. 2hrs

UNIT-IV: COELENTERATA **5hrs**

4.1 Distinguishing features of Phylum Cnidaria and classification up to classes, with suitable examples. 1hr

4.2 Life history of Obelia. 1hrs

4.3 Corals – Types of corals, theories of coral reef formation-Darwin's Subsidence theory, Daly's Glacial control theory. 2hrs

4.4 Polymorphism with reference to Siphonophora **(Self study)** 1hr

UNIT-V: PLATYHELMINTHES **3hrs**

5.1	Distinguishing features and classification up to classes, with suitable examples.	1hr
5.2	Regeneration in Planaria (Dugesia) - Child's axial gradient theory.	1hr
5.3	Parasitology: Parasitic adaptations in tapeworm **(Self study)**	1hr

UNIT-VI: NEMATODA **4hrs**

6.1	Distinguishing features and classification up to classes, with suitable examples.	1hr
6.2	Parasitology: parasitic nematodes – Occurrence, mode of infection, disease caused and control measures of the following: a) *Ancylostoma duodenale* b) *Enterobius vermicularis* c) *Wuchereria bancrofti* d) *Ascaris lumbricoides*	3hrs

UNIT-VII: ANNELIDA **7hrs**

7.1	Distinguishing features and classification up to classes with suitable examples.	1hr
7.2	Nereis a) Externals, structure of head and parapodium. b) Heteronereis, Trochophore larva and its phylogenetic significance	3hrs
7.3	Earthworm morphology and digestive system	2hr
7.4	Vermiculture- an account of how to culture earthworms **(Self study)**	1hr

UNIT-VIII: ARTHROPODA **9hrs**

8.1	Distinguishing features and classification up to classes with suitable examples.	1hr
8.2	Brief account of Trilobites. Unique features and systematic position of Onychophora with respect to Peripatus.	2hr
8.3	Penaeus - externals and appendages.	2hrs
8.5	Brief account of the externals and life history of *Bombyx mori*	1hr
8.6	Integrated pest management (IPM)– biological and chemical methods	1hrs

8.7	Larval forms in crustaceans-Nauplius, Metanauplius, Protozoea, Zoea, Mysis **(Self study)**	2hrs

UNIT-IX: MOLLUSCA **8hrs**

9.1	Distinguishing features and classification up to classes with suitable examples. Brief account of Ammonites.	1hr
9.2	Freshwater mussel- externals, C.S. of shell, respiratory, digestive system and circulatory systems.	4hrs
9.3	Brief account of Pearl culture, chank and lime industries	1hr
9.4	Structure and function of foot in – Neopilina, Chaetoderma, Chiton, Mytilus, Pila, Aplysia, Dentalium and Octopus **(Self study)**	2hrs

UNIT-X: ECHINODERMATA **4hrs**

10.1	Distinguishing features and classification up to classes with suitable examples.	1hr
10.2	Star fish - Externals and water vascular system.	2hrs
10.3	Phylogenetic significance of Echinoderm larva with respect to Bipinnaria, Ophiopluteus, Echinopluteus, and Auricularia Larvae.	1hr

UNIT-XI: MINOR PHYLA **3hrs**

11.1	List of minor phyla with examples. Salient features and affinities of Rotifera	3hrs

Paper Code – ZO1P1

SEMESTER - I

ZOOLOGY PRACTICAL - I

DIVERSITY OF NON-CHORDATES

Total number of Practicals: **10 units**

PROTOZOA

Observation of the following permanent slides: 1 unit

Entamoeba, Vorticella, Foraminiferan ooze, Paramecium – wm/conjugation, Euglena and Noctiluca

Observation of live cultures of protozoans.

PORIFERA

Sycon, Hyalonema, Euplectella 1 unit

Slides: Spicules, and Gemmule

COELENTERATA

Hydra, Physalia, Velella, Porpita, Aurelia, Sea anemone, T.S of sea anemone and Ephyra larva, Fungia, Astrea, Meandrina, Pennatula, Gorgonia 1 unit

PLATYHELMINTHES

Planaria, Tape worm – w.m., scolex, Liver fluke – w.m., T.S. of liver fluke 1 unit

NEMATODA

Male roundworm, T.S. of male round worm, Female round worm, T.S. of female round worm 1 unit

ANNELIDA

Nereis, Parapodium, Heteronereis, Aphrodite, Arenicola, Sabella, Chaetopeterus, Trochophore larva, Earthworm - T.S. passing through the typhlosolar region. Mount setae	1 unit

ARTHROPODA

Peripatus, Centipede, Millipede, Limulus (king crab), Nauplius larva, Mysis larva	1 unit

DISSECTION:

Mounting of the appendages and nervous system (*Penaeus*)	1 unit

MOLLUSCA

Nautilus, Pearl Oyster, Octopus, Sepia, Dentalium, Patella, Cyprea, Haliotes, Cuttle bone, Chiton	1 unit

ECHINODERMATA

Star fish, Brittle star, Sea lily, Sea cucumber, Sea urchin, Cake urchin, Pedicellaria, Bipinnaria larva.	1 unit

SCHEME FOR PRACTICAL EXAMINATION

PRACTICAL - I

DIVERSITY OF NON-CHORDATES

Duration: 3 Hours **Max. Marks: 35**

1	Mounting of prawn appendages	3 x 2	6
2	Identify and Classify giving reasons A-F	4 x 6	24
3	Records		5

REFERENCE BOOKS

1. TEXT OF ZOOLOGY. Vol 1. By Parker and Haswell. CBS Publishers and distributors.
2. INVERTEBRATES STRUCTURE AND FUNCTION. By Barrington. ELBS
3. INVERTEBRATE ZOOLOGY. By Meclisten. Oxford Publishing house.
4. INVERTEBRATES. Vol.1. By Kotpal. Rastogi publications.
5. INVERTEBRATE ZOOLOGY. By Jordan and Verma. S Chand & Co.,
6. INVERTEBRATE ZOOLOGY. By Dhami & Dhami.
7. INVERTEBRATES. By Majpuria.
8. A MANUAL OF ZOOLOGY. Vol 1. By Ekambarnath Iyer and Anantha Krishnan
9. INVERTEBRATE ZOOLOGY Vol I - Vol VI. By L H Hyman McGraw Hill Book Company
10. INVERTEBRATE ZOOLOGY. By Barnes, Hault Saunders, 4th Edition.
11. ECONOMIC ZOOLOGY. By G.S. Hubhla & V.B. Upadhyoya
12. BIOLOGY OF ANIMALS. Vol 1. By Adhikari, Sinha and Ganguli. New central book agency, Calcutta.
13. BIOLOGY OF NON CHORDATES. By Nigam H.C. Naginchand S L and Co. Jallander.
14. PARASITIC PROTOZOA. Baker JR,
15. A GENERAL ZOOLOGY OF THE INVERTEBRATES Carter GS.
16. A STUDENT TEXTBOOK OF ZOOLOGY. Sedgewick.
17. THE INVERTEBRATES, PLATYHELMINTHES AND RHYNCOCOELA. Hyman L H
18. BIOLOGY OF INVERTEBRATES. Hickman CP,
19. INTEGRATED PRINCIPLES OF ZOOLOGY. Hickman CP,
20. ZOOLOGY, Winchester and Lovell, Newyork

MODEL BLUEPRINT

Paper code-ZO121

Title: DIVERSITY OF NON-CHORDATES

Chapter number with title	Number of teaching hours (As mentioned in the syllabus)	Maximum marks for which questions are to be framed from this chapter (including bonus questions)
1. Introduction	3 hrs	5
2. Protozoa	7 hrs	10
3. Porifera	7 hrs	10
4. Coelenterata	5 hrs	7
5. Platyhelminthes	3 hrs	5
6. Nematoda	4 hrs	6
7. Annelida	7 hrs	10
8. Arthropoda	9 hrs	14
9. Mollusca	8 hrs	12
10. Echinodermata	4 hrs	6
11. Minor phyla	3 hrs	5
Total marks excluding bonus questions		70
Total marks including bonus questions		90

Formula to calculate the maximum marks for each chapter:

$$\frac{Number\ of\ teaching\ hours\ \ allotted\ for\ that\ chapter \times maximum\ marks\ (including\ marks\ for\ bonus\ questions}{Total\ number\ of\ teaching\ hours\ (including\ self\ study\ hours)}$$

Register Number:

DATE:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
B.Sc., – I SEMESTER
SEMESTER EXAMINATION: MONTH/YEAR
ZO:121 DIVERSITY OF NON CHORDATES

MODEL QUESTION PAPER

Time- 2 ½ hrs **Max Marks-70**

This paper contains two printed pages and four parts

PART A

I. Answer the following questions. Each question carries 1 mark 7X1= 7

1. _____ symmetry is found in tapeworm.
2. Retention of blastocoel in the adult condition is _____.
3. _____ is a protozoan with photogenic granules.
4. _____ is an example of Hexactinellida.
5. _____ is a solitary coral.
6. Osphradium is a characteristic feature of phylum _____.
7. _____ is a group of sessile crustaceans.

PART B

II. Briefly answer the following questions. Each question carries 2 marks 4 X2 = 8

8. Define holophytic nutrition with an example.
9. Comment on choanocyte.

10. Differentiate between polyp and medusa.

11. How do you identify an arachnid?

PART C

III. Answer any five questions. Each question carries 5 marks **5 X5 = 25**

12. Define metamerism and its types with suitable examples.
13. Comment on Ephyra larva with a labeled diagram.
14. Explain how the tapeworm is adapted to a parasitic mode of life.
15. Comment on the mode of infection, disease caused and treatment by any two nematode parasites found in the intestine of man.
16. With the help of a suitable diagram, explain the characteristics of Nauplius larva.
17. Explain the phylogenetic significance of Bipinnaria larva with a suitable diagram.
18. Mention the affinities of Rotifera to other phyla.

PART D

II. Answer any three questions. Each one carries 10 marks **3X10= 30**

19. Give an account of conjugation in Paramecium.

20. Mention the unique features of phylum Annelida. Classify up to classes with identifying features and examples.

21. Comment on the foot modifications in Mollusca.

22. List out the features of Peripatus and its systematic position.

Course Outcomes: At the end of the course, the student should

CO1	Knowledge	Be able to describe diversity of life, general rules of animal taxonomy, symmetry, germ layers, coelomic cavities, metamerism and cephalization.
CO2	Understand	Be able to classify Clade Protista, associated phyla and class with examples.
CO3	Analyze	Be able to outline the life cycle of parasites and their impacts on health.
CO4	Understand	Be able to classify Phylum Porifera with examples, describe canal system, and skeletal framework or Poriferans.
CO5	Understand	Be able to describe Coelenterates upto class level and their polymorphisms
CO6	Analyze	Be able to evaluate the ecological and economic importance of Coral reef ecosystems.
CO7	Understand	Be able to describe Platyhelminths with classification and life history of Fasciola
CO8	Analyze	Be able to evaluate the health and economic impacts of parasitic platyhelminths.
CO9	Understand	Be able to describe the Phylum Nematoda with parasitic nematodes.
CO10	Application	Be able to analyze the public health problems of parasitic nematodes
CO11	Understand	Be able to identify characters of Phylum Annelida and its classes with examples.
CO12	Application	Be able to describe Vermiculture and Vermicompost.
CO13	Evaluate	Be able to evaluate the ecological and economic importance of Vermitechnology.
CO14	Understand	Be able to classify and describe characteristics of Phylum Arthropoda
CO15	Analyze	Be able to describe and analyze the importance of Integrated Pest Management
CO16	Application	Be able to describe how the life cycle of *Bombyx mori* has been exploited for sericulture.
CO17	Understand	Be able to identify and classify Phylum Mollusca including their economic importance.
CO18	Analyze	Be able to describe the ecological and economic importance of Molluscs
CO19	Understand	Be able to identify and classify Phylum Echinodermata and Minor Phyla.

DEPARTMENT OF ZOOLOGY

SEMESTER	II
TITLE OF THE PAPER	Diversity of Chordates
PAPER CODE	ZO 221
NUMBER OF TEACHING HOURS PER WEEK	4
TOTAL NUMBER OF TEACHING HOURS PER SEMESTER	60 hours [52 hrs (theory) + 8 hrs (Self study)]
NUMBER OF CREDITS	4

Aims and Objectives:

- **To learn the general characters and classification of different of Chordates**
- **To understand the chordate evolutionary tree**

UNIT-I: PROTOCHORDATA **9hrs**

1.1 Salient features of Chordates and classification 3hrs

Origin of Chordates – A brief account of Echinoderm theory, Ascidian theory and Lophophorate theory.

1.2 Hemichordata- Salient features of Hemichordates 2hrs

Balanoglossus-external, Structure of Tornaria larva and its significance

1.3 Cephalochordata- Salient features of Cephalochordates 2hrs

Amphioxus- external and modes of feeding

1.4 Urochordata- Salient features of Urochordates 2hrs

Ascidian-external, Ascidian tadpole and retrogressive metamorphosis

UNIT-II: AGNATHA **4hrs**

2.1 Salient features of Agnatha 1hr

Classification up to classes, with suitable examples

2.2	External features of Petromyzon	1hr
2.3	Ammocoetes larva- structure and its phylogenetic significance	1hr
2.4	Theories regarding the origin of vertebrates-Branchiostome ancestry, Balanoglossus ancestry. **(Self study)**	1hr

UNIT – III: PISCES **7hrs**

3.1	General characters with emphasis on the primary aquatic adaptations, classification up to orders, with suitable examples, Differences between cartilaginous & bony fishes	4hrs
3.2	Pisciculture – rearing, breeding and preservation of fishes	1hr
3.3	Migration of fishes with reference to salmon and eel	1hr
3.4	Brief account of scales in fishes **(Self study)**	1hr

UNIT- IV: AMPHIBIA **16hrs**

4.1	General characters and classification up to living orders with examples, a brief account of the origin of Amphibia	2hrs
4.2	Frog – (Rana sp.) – A brief account of digestive, respiratory, circulatory, nervous, and urinogenital systems	10hrs
4.3	Neuro-endocrine control of metamorphosis in Amphibia	1hr
4.4	Parental care in Amphibia–*Pipa, Gastrothecus, Alytes and Ichthyophis*	1hr
4.5	Frog endoskeleton. **(Self study)**	2hrs

UNIT- V: REPTILIA **6hrs**

5.1	General characters with special reference to terrestrial adaptations and classification of living orders with suitable examples.	2hrs

5.2	Adaptive radiation of extinct Reptiles – Dinosaurs, Pterosaurs, Ichthyosaurs and Mammal-like reptiles	2hrs
5.3	General adaptations in snakes including poison apparatus, venom, types and its effects	1hr
5.4	A brief account of some poisonous snakes of India : Pit viper, cobra, krait and sea snake **(self study)**	1hr

UNIT-VI: AVES **8hrs**

6.1	Adaptations for aerial mode of life – anatomical and physiological	2hrs
6.2	Classification and unique features of modern birds	2hrs
6.3	Differences between Ratitae and Carinatae	1hr
6.4	Migration: Types, factors controlling migration. Ringing and collar technique to determine the route of migration	2hrs
6.5	Brief account of Archaeopteryx **(self study)**	1 hr

UNIT- VII: MAMMALS **10hrs**

7.1	Salient features of Mammals, classification up to orders, with suitable examples.	2hrs
7.2	Origin of Mammals, Salient features of the following: Prototheria, Metatheria, Insectivora, Carnivora, Chiroptera, Perissodactyla, Artiodactyla, Cetacea and Proboscidea	4hrs
7.3	Salient features of Primates. An outline classification of Primates with examples	2hrs
7.4	Adaptive radiation as illustrated by changes in limb structure and types of locomotion. **(Self study)**	2hrs

Paper Code – ZO2P1

SEMESTER - II

ZOOLOGY PRACTICAL - II

DIVERSITY OF CHORDATES

Total Number of Practicals 10 units

PROTOCHORDATES 1 unit

Amphioxus – entire, T.S. through pharynx and T.S. through intestine

Balanoglossus – entire, T.S. passing through proboscis

Ascidia, Ascidian tadpole

AGNATHA 1 unit

Petromyzon, Myxine and Ammocoetes larva

FISHES 1 unit

Electric Ray, Saw fish

Sucker fish, Globe fish, Eel- Muraena, Hippocampus, Flat fish. Accessory respiratory organs in Anabas, Clarias and Saccobranchus.

AMPHIBIANS 2 units

Bufo, Hyla, Amblystoma, Axolotl, Ichthyophis, Necturus, Salamander

Frog Endoskeleton (Skull, Vertebrae, Girdles and limb bones)

REPTILES 1 uit

Draco, Phrynosoma, Varanus, Turtle and Tortoise, poisonous snakes- Viper, Cobra, Krait and Sea snake

BIRDS 1 unit

Endoskeleton (Skull, heterocoelous vertebrae, Sternum, Synsacrum) Beak and feet modifications of parrot, duck, eagle and crow

MAMMALS 3 units

Ant eater, Loris, Mongoose, Hedgehog, Bat

Lower jaw of rabbit, dog or cat, horse or cow, monkey or man, hair, hoof, horns of cow or goat

SCHEME FOR PRACTICAL EXAMINATION

PRACTICAL - II

DIVERSITY OF CHORDATES

Duration: 3 Hours Max. Marks: 35

1	Identify, classify and comment on A-F	4x6	24
2	Comment on the lower jaw/epidermal derivatives/beak & feet modifications	2x3	6
3	Records		5

REFERENCES

1. CHORDATE ZOOLOGY. Bhaskaran, K. K. and Biju Kumar, A. (2003). Manjusha Publications. Calicut. ·
2. A MANUAL OF ZOOLOGY. Ekambaranath Iyer. (2000). Vol. II S. Viswanathan and Co. ·
3. CHORDATE ZOOLOGY. Jordan E. L. and P. S. Verma. (2002). S. Chand and Co. New Delhi ·
4. MODERN TEXTBOOK OF ZOOLOGY: VERTEBRATES. Kotpal, R.L. (2000). Rastogi Publications, Meerut.
5. A MANUAL OF PRACTICAL ZOOLOGY-CHORDATES.Verma, P.S. (2002). S. chand and Co. Ltd.
6. LIFE: AN INTRODUCTION TO BIOLOGY. William S. Beck, Karel, F., Liem and George Gaylord Simpson. (2000). Harper Collins Publishers, New York. 9 ·
7. THE LIFE OF VERTEBRATES. Young J.Z. (2006). Oxford University Press
8. THE VERTEBRATE BODY, W.B.S. Saunders, Philadelphia
9. A TEXT BOOK OF ZOOLOGY Parker, T.J and Haswell, W.A. 1962., Vol.2, Vertebrates, 7th edition Mac Millan Press, London.
10. MANUAL OF ZOOLOGY Ekambaranatha Ayyar, T. N. Ananthakrishnan. Volume II Part I – Chordata
11. VERTEBRATES. F. Harvey Pough, John B. Heiser, Christine M. Janis Benjamin Cummings, 2008 - Hyman's Comparative Vertebrate Anatomy Edited By Marvalee H. Wake
12. A TEXTBOOK OF CHORDATES. R. McNeill Alexander 2002 H.S. Bhamrah (Author), Kavita
13. VERTEBRATE ZOOLOGY; AN INTRODUCTION TO THE COMPARATIVE ANATOMY, EMBRYOLOGY, AND EVOLUTION OF CHORDATE ANIMALS De Beer, Gavin.
14. THE FISHES OF INDIA BEING A NATURAL HISTORY OF FISHES KNOWN TO INHABIT THE WATERS OF BURMA AND CEYLON. Day F.
15. BIOLOGY OF CYCLOSTOMES. Hardisty M W.
16. COLOUR CHANGES IN ANGUILLA. Neil RM,
17. GENERAL ZOOLOGY. Storer and Usinger,
18. EPIGENETICS OF BIRDS. Waddigton CH,
19. VERTEBRATE PALEANTOLOGY. Romer AS, Chicago

MODEL BLUEPRINT

Paper code-ZO221

Title- DIVERSITY OF CHORDATES

Chapter number with title	Number of teaching hours (As mentioned in the syllabus)	Maximum marks for which questions are to be framed from this chapter (including bonus questions)
1. Protochordata	9 hrs	13
2. Agnatha	4 hrs	6
3. Pisces	7 hrs	11
4. Amphibia	16 hrs	25
5. Reptilia	6 hrs	9
6. Aves	8 hrs	12
7. Mammals	10 hrs	14
Total marks excluding bonus questions		70
Total marks including bonus questions		90

Formula to calculate the maximum marks for each chapter:

$$\frac{Number\ of\ teaching\ hours\ \ allotted\ for\ that\ chapter\ \times maximum\ marks\ (including\ marks\ for\ bonus\ questions}{Total\ number\ of\ teaching\ hours\ (including\ self\ study\ hours)}$$

Register Number:

Date:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
B.Sc. - II SEMESTER
SEMESTER EXAMINATION: MONTH/YEAR
ZO 221–DIVERSITY OF CHORDATES

Time- 2 ½ hrs **Max Marks-70**

This paper contains two printed pages and four parts

PART A

I. Answer the following questions. Each question carries one mark (7x1=7)

1. _____ is the cavity found in pectoral girdle for the attachment of humerus.
2. Pneumatic bone is the characteristic feature of _____
3. Heterocercal tail fin is the feature of _____
4. _____ is a fish where the male exhibits parental care
5. Living Agnathans are known as _____
6. _____ is the larva of Petromyzon
7. _____is a sessile chordate

PART B

II. Briefly answer the following. Each question carries two marks (4x2=8)

8. Mention any four characters of Chiroptera
9. Comment on Prototheria
10. What is Anapsid Skull? Explain briefly with an example
11. Mention any four major aquatic adaptations of Fish

PART C

III. Answer any five questions. Each question carries 5 Marks (5x5=25)

12. What is retrogressive metamorphosis? Explain with a suitable diagram.

13. Describe the significance of Tornaria larva

14. What are the salient features of Hemichordates?

15. Explain briefly the significance of lung fishes

16. Classify Amphibia with unique features and examples

17. What are the Reptilian features of Archaeopteryx?

18. Draw a neat labelled diagram of the skull of Frog

PART D

IV. Answer any three questions. Each question carries Ten Marks (3x10=30)

19. Mention the unique features of primates. Classify with suitable examples

20. Comment on the Arterial system of Frog with the help of a suitable diagram

21. Give an outline classification of Fishes with suitable examples

22. Give an account of Flight adaptations in Birds

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Course Outcomes: At the end of the course, the student should

CO1	Knowledge	Be able to identify primitive chordate ancestry, connecting links between non-chordates and chordates, describe diversity of chordates, identify basic chordate characters, classification of protochordates with examples, modes of feeding.
CO2	Understand	Be able to describe general characters and classification of Agnathans with examples..
CO3	Analyze	Be able to describe ammocoetes larva and its phylogenetic significance in origin of vertebrates.
CO4	Understand	Be able to describe the importance of cartilaginous fishes, classification with examples. Be able to describe boney fishes their classification, lung fishes, osteolepids as a connecting link between fishes and amphibians. Migration of fish.
CO5	Application	Be able to describe the practice of pisciculture and preservation of fishes
CO6	Understand	Be able to describe general characters of Amphibia and its living orders with examples. Tadpole as a connecting link between fishes and amphibians. Neuro endocrine control of metamorphosis, parental care.
CO7	Analyze	Use frog as a model to understand nervous, digestive, respiratory, circulatory, urinogenital and skeletal system of vertebrates.
CO8	Understand	Be able to describe general features and classification of Reptilia with examples. Mesozoic reptiles. Poison apparatus, types of venoms. Early origins of birds and mammals.
CO9	Application	Be able to identify poisonous snakes of India. Development of Antivenoms in India.
CO10	Understand	Be able to identify characters and classification of Aves. Avian adaptations in birds, migrations in birds. Brief account of flightless birds.
CO11	Understand	Be able to describe the origin of mammals, outline general characters and classification of mammals upto orders. Special adaptations in aquatic, fossorial, arial, cursorial, arboreal life in mammals.

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