



Telangana university, Dichpally, Nizamabad

# TELANGANA UNIVERSITY

**Dichpally, Nizamabad-503322**

( A State University Established under the Act No.28 of 2006, A.P. Recognized by UGC under 2(f) and 12 (B) of UGC Act 1956) Accredited by NAAC 'B' grade, CGPA: 2.61 )



**B.Sc. I ,II & III YEAR**

**( Semester I to VI )**

**COURSE STRUCTURE AND SYLLABUS UNDER CBCS PATTERN**

**SUBJECT : ZOOLOGY**

**W.e.f. 2016-17**



Telangana university, Dichpally, Nizamabad

**BSc III Years Degree COURSE STRUCTURE AND SYLLABUS UNDER CBCS PATTERN**

**SUBJECT : ZOOLOGY w.e.f.2016-17**

Year	Semester	Paper	Paper Title	No. of Credits	Exam Hrs.	Max. Marks		
						I.A	End Exam	Total
I	I	I-Core Theory	Animal Diversity-Invertebrates	3	3	20	80	100
		I-Core Practical	Animal Diversity-Invertebrates	2	3	-	50	50
	II	II-Core Theory	Ecology, Zoogeography and Animal behaviour	3	3	20	80	100
		II-Core Practical	Ecology, Zoogeography and Animal behaviour	2	3	-	50	50
II	III	III-Core Theory	Animal Diversity-Vertebrates and Developmental Biology	3	3	20	80	100
		III-Core Practical	Animal Diversity-Vertebrates and Developmental Biology	2	3	-	50	50
	IV	IV-Core Theory	Cell Biology, Genetics and Evolution	3	3	20	80	100
		IV-Core Practical	Cell Biology, Genetics and Evolution	2	3	-	50	50
III	V	V-Core Theory	Physiology and Biochemistry	3	3	20	80	100
		V-Core Practical	Physiology and Biochemistry	2	3	-	50	50
	V	VII-Elective Theory	I). Entomology II). Applied Zoology	3	3	20	80	100
		VII-Elective Practical	I). Entomology II). Applied Zoology	2	3	-	50	50
	VI	Core-VI Theory	Immunology and Animal Biotechnology	3	3	20	80	100
		VI-Core Practical	Immunology and Animal Biotechnology	2	3	-	50	50
		VIII-Open Elective Theory	I). Clinical Science	3	3	20	80	100
			II). Aquatic Biology.					
			III). Public Health and Hygiene					
			IV). Medical Transcription					
		VIII-Open Elective Practical	I). Clinical Science	2	3	-	50	50
			II). Aquatic Biology.					
			III). Public Health and Hygiene					
			IV). Medical Transcription					
				40	48			1200



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**COURSE STRUCTURE AND SYLLABUS UNDER CBCS PATTERN**

**SUBJECT : ZOOLOGY**

**BSc I YEAR (I & II SEMESTER)**

**W.e.f. 2016-17**



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**B.Sc. I YEAR ZOOLOGY SYLLABUS UNDER CBCS**

**(With effect from 2016-17)**

**SEMESTER - I**

**Core Paper – I**

**Animal Diversity – Invertebrates**

**Periods: 60 ( 4 Hrs/week )**

**Max. Marks: 100 (20 IE +80 SEE)**

## **UNIT – I (15 Periods)**

### **1.1 Brief history of Invertebrates**

1.1.1. Kingdom Animalia

1.1.2. Brief history of Invertebrates

### **1.2 Protozoa:**

1.2.1 General characters

1.2.2 Classification up to classes with examples

1.2.3 Type study - Elphidium

1.2.4 Life cycle of Plasmodium.

1.2.5 Locomotion, Reproduction and Diseases

### **1.3 Porifera:**

1.3.1 General characters

1.3.2 Classification of Porifera up to classes with examples

1.3.3 Type study - Sycon 1.3.4 Canal system in sponges and Spicules.

## **UNIT – II (15 Periods)**

### **2.1. Cnidaria**

2.1.1 General characters

2.1.2 Classification of Cnidaria up to classes with examples

2.1.3 Type study - Obelia

2.1.4 Polymorphism in hydrozoa

2.1.5 Corals and coral reef formation

### **2.2 Platyhelminthes**

2.1.1 General characters

2.1.2 Classification of Platyhelminthes up to classes with examples

2.1.3 Type study- Schistosoma

### **2.3 Nematelminthes**

2.3.1 General characters

2.3.2 Classification of Nematelminthes up to classes with examples

2.3.3 Type study - Dracunculus

2.3.4 Parasitic Adaptations in Helminthes



## **UNIT – III (15 Periods)**

### **3.1 Annelida**

- 3.1.1 General characters
- 3.1.2 Classification of Annelida up to classes with examples
- 3.1.3 Type study - *Hirudinaria granulosa*.
- 3.1.4 Evolutionary significance of Coelome and Coelomoducts and metamerism

### **3.2 Arthropoda**

- 3.2.1 General characters
- 3.2.2 Classification of Arthropoda up to classes with examples
- 3.2.3 Type study - Prawn
- 3.2.4 Mouth parts of Insects
- 3.2.5 Insect metamorphosis
- 3.2.6 Peripatus - Structure and affinities

## **UNIT – IV (15 Periods)**

### **4.1 Mollusca**

- 4.1.1 General characters
- 4.1.2 Classification of Mollusca up to classes with examples
- 4.1.3 Type study - Pila
- 4.1.4 Pearl formation
- 4.1.5 Torsion and detorsion in gastropods

### **4.2 Echinodermata**

- 4.2.1 General characters
- 4.2.2 Classification of Echinodermata up to classes with examples
- 4.2.3 Water vascular system in star fish
- 4.2.4 Echinoderm larvae and their significance

### **4.3 Hemichordata**

- 4.3.1 General characters
- 4.3.2 Classification of Hemichordata up to classes with examples
- 4.3.3 *Balanoglossus* - Structure and affinities

### **Suggested Readings**

1. L.H. Hyman 'The Invertebrates' Vol I, II and V. – M.C. Graw Hill Company Ltd.
2. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
3. E.L. Jordan and P.S. Verma 'Invertebrate Zoology' S. Chand and Company.



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4. R.D. Barnes 'Invertebrate Zoology' by: W.B. Saunders CO., 1986.
5. Barrington. E.J.W., 'Invertebrate structure and Function' by ELBS.
- 6 P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.
7. Parker, T.J. and Haswell 'A text book of Zoology' by, W.A., Mac Millan Co. London.
8. Barnes, R.D. (1982). Invertebrate Zoology, V Edition"



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## Faculty of Science

### B.Sc. I Year Semester - I Examination

#### ZOOLOGY – CORE PAPER - I

#### ANIMAL DIVERSITY - INVERTEBRATES

### MODEL PAPER

Time: 3 hrs

Max. Marks: 80

Note: Draw labelled diagrams wherever necessary

#### Section- I (Marks: 5x4=20)

Answer any FIVE of the following.

1. Conjugation in Vorticella
2. General characters of Porifera
3. Parasitic Adaptations in Helminthes
4. Formation of Coral reefs
5. Evolutionary significance of Coelomic ducts
6. Explain any two mosquito borne diseases
7. Torsion in Gastropods
8. Affinities of Hemichordata

#### Section- II (Marks: 4x15=60 )

Answer all questions.

9 a). Describe the Life history of Plasmodium

OR

b). Explain in detail about Canal system in sponges

10 a). Give a detailed account on Polymorphism in Coelenterates

OR

b). Describe the Life history of Schistosoma

11a). Describe the Reproductive system of Hirudinaria

OR

b). Explain the Respiratory system of Prawn

12 a). Write the General characters of Mollusca

OR

b). Give an account on Classification of Phylum Echinodermata up to classes



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## **BSc I YEAR ZOOLOGY PRACTICAL SYLLABUS**

### **I - SEMESTER**

### **PAPER - I**

## **ANIMAL DIVERSITY – INVERTEBRATES**

**Periods: 30 (2Hrs/Week)**

**Max. Marks: 50**

### **1. Study of museum slides / specimens / models (Classification of animals up to orders)**

- i. Protozoa:** Amoeba, Paramecium, Paramecium Binary fission and Conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax
- ii. Porifera:** Sycon, Spongilla, Euspongia, Sycon - T.S & L.S, Spicules, Gemmule
- iii. Coelenterata:** Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatula
- iv. Platyhelminthes:** Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium
- v. Nematelminthes:** Ascaris (Male & Female), Dracunculus, Ancylostoma, Wuchereria
- vi. Annelida:** Nereis, Aphrodite, Chaetopterus, Hirudinaria, Trochophore larva
- vii. Arthropoda:** Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Peripatus, Larvae - Nauplius, Mysis, Zoea, Mouth parts of male & female Anopheles and Culex, Mouthparts of Housefly and Butterfly.
- viii. Mollusca:** Chiton, Pila, Unio, Pterodo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva
- ix. Echinodermata:** Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnaria larva
- x. Hemichordata:** Balanoglossus, Tornaria larva

### **2. Dissections:**

**Prawn:** Appendages, Digestive system, Nervous system, Mounting of Statocyst  
Insect Mouth Parts

### **3. Laboratory Record** work shall be submitted at the time of practical examination

4. An “**Animal album**” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

5. Computer aided techniques should be adopted – show virtual dissections





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**Suggested manuals:**

1. Practical Zoology- Invertebrates S.S. Lal
2. Practical Zoology - Invertebrates P.S. Verma
3. Practical Zoology - Invertebrates K.P. Kurl



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## **BSc I YEAR ZOOLOGY PRACTICAL EXAMINATION**

**I- SEMESTER**

**PAPER - I**

**ANIMAL DIVERSITY – INVERTEBRATES**

### **MODEL PAPER**

**Time: 3 Hrs.**

**Max. Marks: 50**

- |   |          |
|---|----------|
| 1. Identification, labelled diagram and salient features of spots: (9x3=27) | 27 Marks |
| (7 Museum specimens + 2 slides)   |          |
| 2. Dissection (one) (labelled Diagram -03 + Dissection & Display-05)        | 08 Marks |
| 3. Field Visit & Note Book  | 04 Marks |
| 4. Project Work   | 03 Marks |
| 5. Certified practical record   | 03 Marks |
| 6. Animal Album   | 03 Marks |
| 7. Viva voce  | 02 Marks |



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## **B.Sc. I YEAR ZOOLOGY SYLLABUS UNDER CBCS**

**(With effect from 2016-2017)**

### **II – SEMESTER**

#### **Core Paper – II**

#### **Ecology, Zoogeography and Animal Behavior**

**Periods: 60 (4Hrs/Week)**

**Max. Marks: 100 (20 IE+80 SEE)**

#### **UNIT – I (15Periods)**

##### **1.1 Ecology -I**

- 1.1.1 Ecosystem structure and functions.
- 1.1.2 Types of Ecosystems –Aquatic and Terrestrial.
- 1.1.3 Biogeochemical cycles - Nitrogen, Carbon, Phosphorus and Water.
- 1.1.4 Energy flow in ecosystem.
- 1.1.5 Food chain, food web and ecological pyramids.
- 1.1.6 Animal Associations - Mutualism, commensalism, parasitism, competition, predation.

#### **UNIT – II (15 Periods)**

##### **2.1 Ecology – II**

- 2.1.1 Concept of Species, Population dynamics and Growth curves.
- 2.1.2 Community Structure and dynamics and Ecological Succession.
- 2.1.3 Ecological Adaptations.
- 2.1.4 Environmental Pollution – Sources, Effect and Control measures of Air, Water, Soil and Noise pollution
- 2.1.5 Wildlife conservation - National parks and Sanctuaries of India, Endangered species.
- 2.1.6. Biodiversity and hotspots of Biodiversity in India.

#### **UNIT – III (15 Periods)**

##### **3.1 Zoogeography**

- 3.1.1 Zoogeographical regions – Palaearctic, Nearctic, Neotropical, Oriental, Australian and Ethiopian regions - their Climatic and faunal peculiarities
- 3.1.2 Wallace line, Discontinuous distribution
- 3.1.3. Continental Drift

#### **UNIT – IV (15 Periods)**



#### **4.1 Animal Behaviour**

4.1.1 Types of Behaviour- Innate and Acquired, Instinctive and Motivated behaviour

4.1.2 Taxes, Reflexes, Tropisms

4.1.3 Physiology and phylogeny of learning, trial and error learning, Imprinting, habituation, Classical conditioning, Instrumental conditioning

4.1.4 Social behavior, Communication, Pheromones

4.1.5 Biological rhythms, Biological clocks, Circadian rhythms

#### **Suggested Readings**

**M.P.Arora**, 'Ecology' Himalaya Publishing company.

**P.D.Sharma**, Environmental Biology'.

**P.R.Trivedi and Gurdeep Raj**. 'Environmental Ecology'

**Buddhadev Sarma and Tej Kumar**, Indian Wildlife Threats and Preservation

**Chapman J.L. and Reiss M.J**, Ecology Principles and Applications, Second Ed., Cambridge University Press, London.

**Benny Joseph**, Environmental Studies, TATA McGraw Hill Com., New Delhi.

**Eugene P. Odum**, Fundamentals of Ecology Third Ed., Nataraj Publishers, Dehradun.

**Veer Bala Rastogi**, "Ecology and Animal Distribution"

**P.K. Gupta**, "Text Book of Ecology and Environment"

**Bhatnagar and Bansal**, "Ecology and Wildlife biology

**Dasmann**, "Wild life Biology"

**Reena Mathur**, "Animal Behaviour"

**Aloccock**, "Animal Behaviour- an Evolutionary Approach



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## **FACULTY OF SCIENCE**

**B.Sc. I Year Examination**

**Subject : ZOOLOGY**

**II SEMESTER      Core Paper – II**

**(Ecology, Zoogeography and Animal Behaviour)**

**Time: 3 hrs**

**Max. Marks: 80**

**Note : Draw labelled diagrams wherever necessary**

### **Section- I (Marks: 5x4=20)**

**Answer any FIVE (Short Answer type) of the following.**

- 1 . Social Behaviour
2. Brief the Hot spots of Biodiversity in India
3. Energy flow in Agricultural ecosystem
4. Arboreal adaptations
5. Explain Wallace line
6. Role of Decomposers
7. Global warming
8. Reflexes

### **Section- II (Marks: 4x15=60)**

**Answer all questions (Long Answer).**

9 a). What is Bio-geo chemical cycle? Explain Nitrogen cycle

OR

b). Describe Pond Ecosystem and its fauna

10 a). What is ecological Succession? Explain a hydrosphere community

OR

b). Explain various effects of Air pollution and its controlling measures

11 a). Describe the climatic conditions and faunal peculiarities of Oriental region

OR

b). Write about Mutualism and Commensalism by taking two examples each

12 a). Differentiate Classical and Instrumental conditioning citing suitable examples

OR

b). Explain Biological and Circadian rhythms giving two examples each



## **B.Sc. I YEAR ZOOLOGY PRACTICAL SYLLABUS**

### **II SEMESTER Core Paper – II**

#### **Ecology, Zoogeography and Animal Behavior**

**Periods: 30 ( 2Hrs/Week)**

**Max. Marks: 50**

1. Determination of pH of Soil and Water
2. Estimation of salinity (chlorides) of water in given samples.
3. Estimation of Carbonates and bicarbonates in the given water samples.
4. Estimation of dissolved oxygen of pond water, sewage water and effluents.
5. Identification of Zooplankton from a nearby water body.
6. Study of Pond Ecosystem / local polluted site - Report submission
7. Study of at least 3 endangered or threatened wild animals of India through photographs / specimens / models
8. Field visit to Zoo Park to study the management, behavior and enumeration of wild animals.
9. Identification of Zoogeographical realms from the Map and identify specific fauna of respective regions.
10. Observe the response of invertebrates in different lightening conditions      Computer aided techniques should be adopted as per UGC guide lines.

#### **Suggested manuals**

1. **Robert Desharnais, Jeffrey Bell**, 'Ecology Student Lab Manual, Biology Labs'
2. **Darrell S Vodopich**, 'Ecology Lab Manual'



**BSc I YEAR ZOOLOGY PRACTICAL EXAMINATION**  
**II SEMESTER - Core Paper – II**  
**Ecology, Zoogeography and Animal Behavior**  
**MODEL PAPER**

**Time: 3 Hrs.**

**Max. Marks: 50**

- |   |          |
|---|----------|
| 1. Identification, labeled diagram and salient features of Spots:<br>(06 spots) | 18 Marks |
| 2. Estimation of dissolved oxygen of a pond, --                                 | 09 Marks |
| 3. Identify any Five Zooplankton in a given water samples --                    | 05 Marks |
| 4. Field Visit & Note Book ----   | 05 Marks |
| 5. Project Report ----  | 05 Marks |
| 6. Certified practical record ----  | 05 Marks |
| 7. Viva voce ----   | 03 Marks |



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**COURSE STRUCTURE AND SYLLABUS UNDER CBCS PATTERN**

**SUBJECT : ZOOLOGY**

**BSc II YEAR (III & IV SEMESTER)**

**W.e.f. 2017-18**





**B.Sc.II Year ZOOLOGY SYLLABUS UNDER CBCS**  
**(With effect from 2017-18)**  
**III – SEMESTER**  
**Core Paper – III**  
**Animal Diversity- Vertebrates and Developmental Biology**

**Periods: 60 (4 Hrs/Week)**

**Max. Marks: 100 (20-IE+80-SEE)**

**UNIT – I (15 Periods)**

**1.1. Urochordata, Cephalochordata, Cyclostomata**

- 1.1.1. Salient features of Urochordata
- 1.1.2. Retrogressive metamorphosis and its significance in Urochordata
- 1.1.3. Salient features and affinities of Cephalochordata
- 1.1.4. General characters of Cyclostomata
- 1.1.5. Comparison of the Petromyzon and Myxine
- 1.1.6. General characters and classification of Chordata upto orders with examples.

**1.2. Pices**

- 1.2.1. General characters of Fishes
- 1.2.2. Classification of fishes up to order level with examples
- 1.2.3. Scoliodon – Respiratory, Circulatory and Nervous system.
- 1.2.4. Types of Scales and types of Fins

**UNIT – II (15 Periods)**

**2.1. Amphibia**

- 2.1.1. General characters of Amphibians
- 2.1.2. Classification of Amphibians up to orders with examples.
- 2.1.3. Rana tigrina - Respiratory, Circulatory and Nervous system.
- 2.1.4. Parental care in amphibia, Neotony.

**2.2 Reptilia**

- 2.2.1. General characters of Reptilia
- 2.2.2. Classification of Reptilia up to orders with examples
- 2.2.3. Calotes – Respiratory system, Circulatory and Nervous system.
- 2.2.4. Temporal fosse in reptiles and its evolutionary importance
- 2.2.5. Distinguished characters of Poisonous and Non poisonous snakes.
- 2.2.6. Rhynchocephalia.



### **UNIT – III (15 Periods)**

#### **3.1. Aves**

- 3.1.1. General characters of Aves
- 3.1.2. Classification of Aves up to orders with examples.
- 3.1.3. Columba livia -, Digestive system, Circulatory systems, Respiratory system and Nervous system.
- 3.1.4. Migration in Birds
- 3.1.5. Flight adaptation in Birds

#### **3.2. Mammalia**

- 3.2.1. General characters of Mammalia
- 3.2.2. Classification of Mammalia up to orders with examples
- 3.2.3. Rabbit –Digestive, Respiratory, Circulatory and Nervous system.
- 3.2.4. Dentition in mammals. 3.2.5. Aquatic adaptations in Mammals.

### **UNIT – IV (15 Periods)**

#### **4.1 Developmental Biology and Embryology**

- 4.1.1 Gametogenesis (Spermatogenesis and Oogenesis)
- 4.1.2 Fertilization
- 4.1.3 Types of eggs
- 4.1.4 Types of cleavages
- 4.1.5 Development of Frog up to formation of primary germ layers
- 4.3 Formation of Foetal membrane in chick embryo and their functions
- 4.4 Types and functions of Placenta in mammals
- 4.5 Regeneration in Turbellaria and Lizards

#### **Suggested Readings:**

1. E.L.Jordan and P.S. Verma 'Chordate Zoology' -. S. Chand Publications.
2. Mohan P.Arora. 'Chordata – I, Himalaya Publishing House Pvt.Ltd.
3. Marshal, Parker and Haswell 'Text book of Vertebrates'. ELBS and McMillan, England.
4. Alfred Sherwood Romer. Thomas S. Pearson 'The Vertebrate Body, Sixth edition, CBS college Publishing, Saunders College Publishing
5. George C. Kent, Robert K. Carr. Comparative Anatomy of the Vertebrates, 9th ed. McGraw Hill.
6. Kenneth Kardong Vertebrates: Comparative Anatomy, Function and Evolution, 4th ed, 'McGraw Hill.
7. J.W. Young, The Life of Vertebrates, 3rd ed, Oxford University press.
8. Harvey Pough F, Christine M. Janis, B. Heiser, Vertebrate Life, Pearson, 6th ed, Pearson Education Inc.2002.



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**B.Sc. II Year Semester –III Examination**  
**ZOOLOGY** **CORE PAPER - III**  
**Animal Diversity- Vertebrates and Developmental Biology**  
**MODEL PAPER**

**Time: 3 hrs**

**Max. Marks: 80**

**Note :** Draw labelled diagrams wherever necessary.

**Section- I (Marks: 5x4=20)**

**Answer any FIVE (Short Answer) of the following questions**

1. Describe the General characters of Cyclostomes
2. Temporal fosse in reptiles
3. General characters of Chordates
4. Parental care in Amphibians
5. Brief account of Dipnoi Fishes
6. Explain briefly about Regeneration
7. Draw a labelled diagram of Respiratory system of Pigeon
8. Describe the dentition in Mammals

**Section- II (Marks: 4x15=60)**

**Answer the following questions (Long Answer).**

- 9 a). Write an essay on migration of Fishes with suitable examples.  
Or  
b). What is Retrogressive metamorphosis? Explain in Herdmania
- 10 a). Describe the classification of Amphibians up to order level with suitable examples  
Or  
b). Discuss the distinguished characters of Poisonous and Non-Poisonous snakes
- 11 a). Explain the General characters of Mammals  
Or  
b). Write an essay on flight adaptations of Birds
- 12 a). Explain the mechanism of Fertilization and its significance  
Or  
b). Describe the structure and functions of Placenta

**BSc II Year ZOOLOGY PRACTICAL SYLLABUS**



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**III SEMESTER                      CORE PAPER - III**  
**Animal Diversity- Vertebrates and Developmental Biology**

**Periods: 30 (2Hrs/Week)**

**Max. Marks: 50**

**Study of museum slides / specimens / models (Classification of animals up to orders)**

- 1. Protochordata:** Amphioxus, Amphioxus T.S. through pharynx
- 2. Cyclostomata:** Petromyzon, Myxine, Ammocoetus larva
- 3. Pisces:** Sphyrna Pristis, Torpedo, Channa, Pleuronectes, Hippocampus, Exocoetus, Echieneis, Labeo, Catla, Clarius, Auguilla, Protopterus, Scales: Placoid, Cycloid, Ctenoid
- 4. Amphibia:** Ichthyophis, Amblystoma, Siren, Hyla, Rachophous, Bufo, Rana, Axolotal larva
- 5. Reptilia :** Draco, Chamaeleon, Gecko, Uromastix, Vipera russeli, Naja, Bungarus, Enhydrina, Typhlops, Testudo, Trionyx, Crocodilus, Ptyas.
- 6. Aves:** Archaeopteryx, Passer, Psittacula, Bubo, Alcedo, Columba, Corvus, Pavo, Collection and study of different types of feathers: Quill, Contour, Filoplume, Down
- 7. Mammalia:** Ornithorhynchus, Tachyglossus, Pteropus, Funambulus, Manis, Loris, Hedgehog;
- 8. Histology:**  
T.S. of Liver, Pancreas, Kidney, Stomach, Intestine, Lungs Artery, Vein, Bone T.S., Spinal cord.
- 9. Osteology :**  
1. Rabbit – Axial skeleton system (bones of Skull and Vertebral Column) 2. Varanus, Pigeon and Rabbit – Appendicular skeleton system (bones of limbs and girdles)  
Dissections of Labeo/Tilapia: 1. Digestive system. 2. Brain, Weberian ossicles 3. V, VII, IX, X cranial nerves
- 10. Embryology**  
1. Study of T.S. of Testis and Ovary of a mammal  
2. Study of different stages of cleavages (2, 4, 8, 16 cell stages); Morula, Blastula  
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

**11. Laboratory Record work shall be submitted at the time of practical examination**

**An “Animal album” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.**

**12. Computer aided virtual dissections.**

**Suggested manuals**

1. S.S.Lal, Practical Zoology – Vertebrata
2. P.S.Verma, A manual of Practical Zoology – Chordata
3. Freeman & Bracegirdle, An atlas of embryology



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## **BSc II Year ZOOLOGY PRACTICAL EXAMINATION**

### **III SEMESTER**

### **CORE PAPER - III**

**Animal Diversity- Vertebrates and Developmental Biology**

### **MODEL PAPER**

**Time: 3 Hrs.**

**Max. Marks: 50**

**Identification, labeled diagram and salient features of spots:**

1. 6 Museum specimens + 2 slides)	24 Marks
2. Osteology (02 Spots) ----	04 Marks
3. Dissection (one) (Diagram -02 + Dissection & Display-05) --	07 Marks
4. Embryology (02 Spots) ----	04 Marks
5. Certified practical record ----	04 Marks
6. Animal Album ----	05 Marks
7. Viva voce ----	02 Marks

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**B.Sc. II Year ZOOLOGY SYLLABUS UNDER CBCS  
(With effect from 2017-18)**

**IV – SEMESTER**

**Core Paper – IV**

**Cell Biology, Genetics and Evolution**

**Periods: 60 (4Hrs/Week)**

**Max. Marks: 100 (20-IE+80-SEE)**

**UNIT – I (15 Periods)**

1. Cell Biology
- 1.1. Cell theory, Differences of Prokaryotic and Eukaryotic cells
- 1.2. Ultrastructure of animal cell
- 1.3. Structure and functions of plasma membrane proteins.
- 1.4. Structure and functions of cell organelles – Endoplasmic reticulum, Golgi body, Ribosomes, Lysosomes, centrosomes, Mitochondria and Nucleus
- 1.5. Chromosomes – Structure, types, giant chromosomes
- 1.6. Cell Division - Mitosis, Meiosis.
- 1.7. Cell cycle and its regulation.

**UNIT – II (15 Periods)**

**2. Molecular Biology**

- 2.1. DNA (Deoxyribo Nucleic Acid) - Structure
- 2.2. RNA (Ribo Nucleic Acid) - Structure, types
- 2.3. DNA Replication
- 2.4. Protein Synthesis – Transcription and Translation
- 2.5. Gene Expression – Genetic Code; operon concept
- 2.6. Molecular Biology Techniques- Polymerase Chain Reaction, Electrophoresis

**UNIT – III (15 Periods)**

**3. Genetics**

- 3.1 Mendel's laws of Inheritance and Non-Mendelian Inheritance
- 3.2 Linkage and Crossing over
- 3.3 Sex determination and sex-linked inheritance
- 3.4 Chromosomal Mutations- Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy.
- 3.5. Gene mutations- Induced versus Spontaneous mutations.
- 3.6. Inborn errors of metabolism. 3.7. One gene one enzyme, one gene one polypeptide theory.

**UNIT – IV (15 Periods)**

**4. Evolution**

- 4.1. Theories of evolution – Lamarckism and Neo-Lamarckism, Darwinism and NeoDarwinism, Modern synthetic theory.
- 4.2. Evidences of Evolution and Hardy Weinberg Law.
- 4.3. Forces of Evolution – mutation, gene flow, genetic drift, and natural selection.
- 4.4. Isolation – Pre-mating and post mating isolating mechanisms



4.5. Speciation: Methods of speciation - Allopatric and sympatric

4.6. Causes and Role of Extinction in Evolution.

### **Suggested readings**

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H. Free man and company New York..
2. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition.Wiley India.
3. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition.John Wiley and Sons Inc.
4. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
5. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
6. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
7. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
8. Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). Evolution. Cold Spring, Harbour Laboratory Press.
9. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
10. Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.
11. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
12. Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.
13. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
14. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
15. Gupta P.K., 'Genetics'



Telangana university, Dichpally, Nizamabad

## Faculty of Science

B.Sc. II Year

IV SEMESTER

ZOOLOGY

Core Paper – IV

Cell Biology, Genetics and Evolution

### MODEL PAPER

Time: 3 hrs

Max. Marks: 80

Note : Draw labelled diagrams wherever necessary

#### Section- I (Marks: 5x4=20)

Answer any FIVE of the following questions (Short Answer).

1. Describe law of segregation citing an example
2. Structure of DNA
3. Differentiate prokaryotic and eukaryotic cells
4. Explain Hardy Weinberg law.
5. Crossing over
6. Explain briefly about Polyploidy
7. Draw a labeled diagram of Ultra structure of Animal Cell
8. Explain briefly different types of reproductive isolations

#### Section- II (Marks: 4x15=60)

Answer the following questions (Long Answer).

- 9 a). Describe the fluid mosaic structure and functions of Plasma membrane  
Or  
b). Explain different types of chromosomes
- 10 a). Describe the different phases in Protein synthesis  
Or  
b). Explain in detail about Mitosis
- 11 a). Explain Epistasis with suitable example  
Or  
b). What is sex linked inheritance? Explain with Haemophilia and Colour blindness
- 12 a). Explain the differences in between Allopatric and Sympatric speciations  
Or  
b). Explain briefly the evidences of organic evolution citing suitable examples





## **BSc II Year ZOOLOGY PRACTICAL SYLLABUS**

### **IV SEMESTER**

#### **Core Paper – IV**

#### **Cell Biology, Genetics and Evolution**

**Periods: 30**

**Max. Marks: 50**

#### **I. Cytology**

1. Preparation and Identification of slides of Mitotic divisions with onion root tips
2. Preparation and Identification of different stages of Meiosis in Grasshopper Testes
3. Identification and study of the following slides
  - i). Different stages of Mitosis and Meiosis
  - ii) Lamp brush and Polytene chromosomes

#### **II. Genetics**

1. Problems on Genetics - Mendelian inheritance, Linkage and crossing over, Sex linked inheritance

#### **III. Evolution**

1. Museum Study of Fossil animals: Peripatus, Coelacanth Fish, Dipnoi fishes, Sphenodon, Archeopteryx.
2. Study of homology and analogy from suitable specimens and pictures
3. Problems on Hardy-Weinberg Law
4. Macroevolution using Darwin finches (pictures)

**Laboratory Record work shall be submitted at the time of practical examination**

An "Album" containing photographs, cut outs, with appropriate write-up about Genetics and Evolution.

**Computer aided techniques should be adopted as per UGC guide lines.**

#### **Suggested manuals**

1. Manual of laboratory experiments in cell biology Edward, G.



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## **B.Sc. II Year ZOOLOGY PRACTICAL EXAMINATION**

### **IV SEMESTER**

### **CORE PAPER – IV**

**Cell Biology, Genetics and Evolution**

### **MODEL PAPER**

**Time: 3 Hrs.**

**Max. Marks: 50**

1. Identification, labeled diagram and salient features of spots: ----- (06 spots)	18
2. Prepare and Identify Mitotic divisions with onion root tips: -----	10
3. One Problem from Genetics -----	05
4. One Problem from Evolution -----	05
5. Certified practical record -----	05
6. Album -----	05
7. Viva voce -----	02



Telangana university, Dichpally, Nizamabad

**COURSE STRUCTURE AND SYLLABUS UNDER CBCS PATTERN**

**SUBJECT : ZOOLOGY**

**BSc III YEAR (V & VI SEMESTER)**

**W.e.f. 2018-19**



Telangana university, Dichpally, Nizamabad

## **B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

(With effect from 2018-19)

**V – SEMESTER                      Core Paper – V**

**Physiology and Biochemistry**

**Periods: 45 (3 hrs/week)**

**Max. Marks: 100**

### **UNIT – I    Physiology (11 Periods)**

#### **1.1 Digestion**

- 1.1.1 Digestion definition and extra and intracellular digestion.
- 1.1.2. Digestion of Carbohydrates, Proteins, Lipids and Cellulose.
- 1.1.3. Absorption and Assimilation of digested food.
- 1.1.4. Role of Gastrointestinal hormones in digestion

#### **1.2. Respiration**

- 1.2.1. Definition of Respiration and Respiratory mechanisms – External, Internal and cellular.
- 1.2.2. Respiratory Pigments
- 1.2.3. Transport of oxygen, Oxygen dissociation curves. Bohr's effect.
- 1.2.4. Transport of CO<sub>2</sub> – Chloride shift.
- 1.2.5. Regulation of respiration – nervous and chemical

#### **1.3 Circulation**

- 1.3.1. Types of circulation - Open and Closed circulation
- 1.3.2. Structure of Mammalian Heart, Types of hearts – Neurogenic and Myogenic.
- 1.3.3. Heart function – Conduction and regulation of heart beat.
- 1.3.4. Regulation of Heart rate – Tachycardia and Bradycardia
- 1.3.5. Blood Clotting mechanism

### **UNIT – II    Physiology (11 Periods)**

#### **2.1. Excretion**

- 2.1.1. Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic
- 1.1.2.. Structure and function of Nephron
- 1.1.3. Urine formation, Counter current mechanism.

#### **2.2. Muscle Contraction**

- 2.2.1. Types of Muscles
- 2.2.2. Ultra structure of skeletal muscle fibre
- 2.2.3. Sliding Filament theory, muscle contraction mechanism and energetics.

#### **2.3. Nerve Impulse**

- 2.3.1. Structure of Neuron
- 2.3.2. Nerve impulse - Resting potential and Action potential and Conduction of Nerve                      impulse



2.3.3. Synapse, types of synapses and Synaptic transmission.

### **UNIT – III Physiology & Biochemistry (11 periods)**

#### **3.1. Endocrine System**

- 3.1.1. Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal glands and Pancreas
- 3.1.2. Hormone action and concept of Secondary messengers
- 3.1.3. Male and Female Hormones, Hormonal control of Menstrual cycle in humans.

#### **3.2. Homeostasis and Enzymes**

- 3.2.1. Concept of Homeostasis.
- 3.2.2. Mechanism of Homeostasis.
- 3.2.3. Osmoregulation - Water and ionic regulation by freshwater, brackish water and marine animals
- 3.2.4. Enzymes: Definition, Classification, Inhibition and Regulation

### **UNIT – IV Biochemistry (12 periods)**

#### **4. Bio molecules and Metabolism**

- 4.1. Carbohydrates: Classification and function of Carbohydrates
- 4.2. Carbohydrate metabolism - Glycolysis, Krebs cycle, , Electron transport and oxidative phosphorylation.
- 4.3. Proteins: Classification of proteins based on functions and Chemical nature
- 4.4. Protein Metabolism – Transamination, Deamination and Urea Cycle
- 4.5. Lipids: Classification of Lipids
- 4.6. Lipid Metabolism – Fatty acid synthesis and Fatty acid oxidation.

#### **Suggested readings**

1. Gerard J. Tortora and Sandra Reynolds Garbowski Principles of Anatomy and Physiology, Tenth Ed., John Wiley & Sons
2. Arthur C. Guyton MD, A Text Book of Medical Physiology, Eleventh ed., John E. Hall, Harcourt Asia Ltd.
3. William F. Ganong, A Review of Medical Physiology, 22 ed, McGraw Hill, 2005
4. Sherwood, Klandrof, Yanc, Animal Physiology, Thompson Brooks/Coole, 2005.
5. Knut Schmidt-Nielson, Animal Physiology, 5th ed, Cambridge Low Price Edition.
6. Roger Eckert and Randal, Animal Physiology, 4th ed, Freeman Co, New York.
7. Singh. H.R, Text Book of Animal Physiology and Biochemistry
8. Nagabhushanam , Comparative Animal Physiology
9. Veer Bal Rastogi, Text Book of Animal Physiology

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**Faculty of Science**  
**B.Sc. III Year V - SEMESTER**  
**ZOOLOGY Core Paper – V**  
**Physiology and Biochemistry**  
**MODEL PAPER (Theory)**

**Time: 3 hrs**

**Max. Marks: 80**

**Note : Draw labelled diagrams wherever necessary**

**Section- I (Marks: 5x4 = 20)**

**Answer any Five of the following questions (Short Answer)**

1. Types of Hearts
2. Structure of Glucose
3. Labelled diagram of Neuron
4. Explain the role of gastrointestinal hormones.
5. Respiratory pigments
6. Explain briefly about Krebs cycle
7. Draw a labelled diagram of Ultra structure Skeletal muscle fibre
8. Explain briefly about Homeostasis

**Section- II (Marks: 4x15=60)**

**Answer the following questions (Long Answer) .**

- 9 a). Describe the process of carbohydrate digestion in mammals  
Or  
b). Explain in detail about transportation of gases in human
- 10 a). Write about working mechanism of mammalian Heart  
Or  
b). Describe the structure and function of nephron
- 11 a). Explain Ultra structure of skeletal muscle fibre  
Or  
b). What is Synapse? Explain Synaptic transmission
- 12 a). Explain the structure of Thyroid gland , its secretions and functions  
Or  
b) Write about the structure and classification of Proteins

**B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**



Telangana university, Dichpally, Nizamabad

**V - SEMESTER**  
**Core Paper – V**  
**Physiology and Biochemistry**

**Periods: 30 (2 hrs/week)**

**Max. Marks: 50**

1. Qualitative tests for identification of carbohydrates, proteins and lipids.
2. Qualitative tests for identification of ammonia, urea and uric acid (Nitrogenous excretory products)
3. Effect of pH and Temperature on salivary amylase activity.
4. Study of permanent histological sections of Mammalian Endocrine glands - pituitary, thyroid, pancreas, adrenal gland.
5. Estimation of Haemoglobin by Sahlis method.
6. Estimation of total protein by Lowry's method.
7. Estimation of unit Oxygen consumption of fish with reference to body weight.

- **Laboratory Record work shall be submitted at the time of practical examination**
- **Computer aided techniques should be adopted as per UGC guide lines.**

**Suggested manuals**

**Tortora, G.J. and Derrickson, B.H.** (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.

**Widmaier, E.P., Raff, H. and Strang, K.T.** (2008) Vander's Human Physiology, XI Edition.,

**McGraw Hill Guyton, A.C. and Hall, J.E.** (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

**Berg, J. M., Tymoczko, J. L. and Stryer, L.** (2006). Biochemistry. VI Edition. W.H Freeman and Co.

**Nelson, D. L., Cox, M. M. and Lehninger, A.L.** (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.

**Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W.** (2009).

**Harper's Illustrated Biochemistry.** XXVIII Edition. Lange Medical Books/Mc Graw3Hill.



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**B.Sc. III Year ZOOLOGY PRACTICAL EXAMINATION**

**V - SEMESTER                      Core Paper – V**

**Physiology and Biochemistry**

**MODEL PAPER**

**Time: 3 Hrs.**

**Max. Marks: 50**

1. Identification, labeled diagram and salient features of spots: ----- (05 spots)	10
2. Estimation of .....from Biochemistry -----	06
3. Identification/Study of.....from Physiology -----	06
4. Qualitative Test -----	06
5. Project Work -----	05
6. Certified practical record -----	05
7. Viva voce -----	02





Telangana university, Dichpally, Nizamabad

## **B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

### **V -SEMESTER Paper –VII (Elective –I)**

#### **Entomology**

**Periods: 45 (3 hrs/week)**

**Max. Marks: 100**

#### **UNIT –I: Basics of Entomology (11 Periods)**

- 1.1. Definition, scope and importance of Entomology.
- 1.2. Insect classification and their distinctive characters.
- 1.3. Insect External morphology-Head, Thorax, and Abdomen.
- 1.4. Insect Internal Morphology –Digestive, Respiratory, Circulatory, Excretory, Nervous, and Reproductive systems.
- 1.5. Insect growth and development.

#### **UNIT –II: Insect vectors and pests. (11 Periods)**

- 2.1. Introduction and history of medical entomology
- 2.2. Vectors of public health importance –Mosquitoes, Housefly, Sand fly, Lice & Bedbugs
- 2.3. Vector-borne diseases-(Malaria, Dengue, Filaria) and their control measures.
- 2.4. Role of pests in Agriculture.
- 2.5. Crop Pests and their control measures

#### **UNIT –III: Beneficial Insects (11 Periods)**

##### **3.1. Apiculture.**

- 3.1. Selection of Bee Species for Apiculture.
- 3.2. Bee Keeping Equipment.
- 3.3. Methods of Extraction of Honey (Indigenous and Modern).
- 3.4. Bee Diseases and Enemies.
- 3.1.5. Products of Apiculture Industry and its Uses (Honey, Bees Wax).

#### **UNIT –IV : Beneficial Insects and Harmful Insects (12 Periods)**

##### **4.1. Sericulture.**

- 4.1.1. Life cycle of Bombyx mori
- 4.1.2. Structure of silk gland and secretion of silk
- 4.1.3. Silkworm rearing technology.
- 4.1.4. Spinning, harvesting and storage of cocoons.
- 4.1.5. Silk worm Pests and Diseases: Uzi fly; Protozoan, Viral, Fungal and Bacterial; Control and prevention.
- 4.1.6. Prospects of Sericulture in India

##### **4.2. Social life of Insects.**

##### **4.3. Venomous Insects.**



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**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**V -SEMESTER Paper –VII (Elective –I)**

**Entomology**

**MODEL PAPER**

**Time: 3 hrs**

**Max. Marks: 80**

Note : Draw labelled diagrams wherever necessary

**Section –I (5X4=20 Marks)**

I. Answer any FIVE of the following questions

1. I Unit
2. I Unit
3. II Unit
4. II Unit
5. III Unit
6. III Unit
7. Unit IV
8. Unit IV

**Section- II (Marks: 4x15=60)**

II. Answer any FOUR (Long Answer) of the following questions

9a). I Unit

OR

b). I Unit

10a). II Unit

OR

b). II Unit

11a). III Unit

OR

b). III Unit

12a). IV Unit

OR

b). IV Unit



Telangana university, Dichpally, Nizamabad

## **B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**

**V – SEMESTER**

**Paper – VII (Elective-I)**

### **Entomology**

**Periods: 30 (2 hrs/week)**

**Max. Marks: 50**

1. Identification and study of house hold Insects -Cockroach, Silver fish, Crickets
2. Identification and study of important Insect vectors –Mosquitoes, House fly, Head lice.
3. Mounting of mouth parts of mosquitoes.
4. Identification different larvae of silk worm-Using specimens / pictures.
5. Field visits to a Sericulture/ apiculture farm and submission of report.

#### **References**

1. Text Book of Applied Entomology Vol. I & II by K. P. Srivastava
2. General Applied Entomology by B V David and T N Anathakrishnan
3. Destructive and Useful Insects by C. L. Metcalf
4. A text book of Entomology by Mathur and Upadhay



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## **B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**(With effect from 2018-19)**

### **V – SEMESTER PAPER – VII (ELECTIVE-II)**

#### **Applied Zoology**

**Periods: 45 (3 hrs/week)**

**Max. Marks: 100**

#### **UNIT – I (11 Periods)**

##### **1. Aquaculture**

- 1.1. Types of Fisheries
- 1.2. Fresh Water Fish and Prawn culture
- 1.3. Fresh water fishing gears and crafts.
- 1.4. Induced Breeding.
- 1.5. Hatchery design and Management of fish and prawn.
- 1.6. Transportation of fish and prawn seed.
- 1.7. Preservation, Processing and By-products of fishes.
- 1.8. Fish Diseases and control measures

#### **UNIT – II Sericulture (11 Periods)**

- 2.1. Life cycle of Bombyx mori
- 2.2. Structure of silk gland and secretion of silk
- 2.3. Silkworm rearing technology.
- 2.4. Spinning, harvesting and storage of cocoons.
- 2.5. Silk worm Pests and Diseases: Uzi fly; Protozoan, Viral, Fungal and Bacterial; Control and prevention.
- 2.6. Prospects of Sericulture in India

#### **UNIT – III (12 Periods)**

##### **3. Apiculture and Vermiculture**

- 3.1. Selection of Bee Species for Apiculture.
- 3.2. Bee Keeping Equipment.
- 3.3. Methods of Extraction of Honey (Indigenous and Modern).
- 4.4. Bee Diseases and Enemies.
- 3.5. Products of Apiculture Industry and its Uses (Honey, Bees Wax).
- 3.6. Introduction of Vermiculture and Vermicomposting.
- 3.7. Vermiculture techniques.
- 3.8. Bedding, Essential parameters for Vermiculture and Management
- 2.9. Methods of Harvesting (Manual & Mechanical).
- 2.10. Economic Importance of Vermiculture.



## UNIT – IV (11 Periods)

### 4. Poultry Farming & Animal Husbandry

- 4.1. Classification of Fowls based on their use – Broilers and Commercial layers.
- 4.2. Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs.
- 4.3. Poultry diseases - Viral, Bacterial, Fungal, Protozoan
- 4.4. Management of a modern Poultry Farm, progressive plans to promote Poultry as a SelfEmployment venture
- 4.5. Dairy farm and its management
- 4.6. Animal Husbandry – Introduction, Preservation of semen, artificial insemination of cattle, Induction of early puberty and synchronization of estrus in cattle

### Suggested Readings

1. Prost, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.
2. Bisht. D.S., Apiculture, ICAR Publication.
3. Singh S., Beekeeping in India, Indian council of Agricultural Research, NewDelhi.
4. Ullal S.R. and Narasimhanna, M.N. Handbook of Practical Sericulture: CSB, Bangalore
5. Jolly. M. S. Appropriate Sericultural Techniques; Ed., Director, CSR & TI, Mysore.
6. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co.
7. Narasimhanna, M. N. Manual of Silkworm Egg Production;, CSB, Bangalore 1988.
8. Wupang—Chun and Chen Da-Chung, Silkworm Rearing;, Pub. By FAO, Rome 1988.
9. Sengupta, K. A Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore 1989.
10. Krishnaswamy, S. Improved Method of Rearing Young age silkworm; CSB, Bangalore, 1986.
11. Jhingran. V.G. Fish and fisheries in India.,
12. Khanna. S.S, An introduction to fishes
13. Santanam, B. et al, A manual of freshwater aquaculture,
14. Boyd. C.E. & Tucker.C.S, Pond aquaculture water quality management,
15. Biswas.K.P, Fish and prawn diseases,
16. Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea & Fabiger Publisher
17. Dunham R.A. (2004). Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI
18. Pedigo, L.P. (2002). Entomology and Pest Management, Prentice Hall.
19. Lee, Earthworm Ecology
20. Stevenson, Biology of Earthworms
21. Ranganathan L.S, Vermicomposting technology- soil health to human health



Telangana university, Dichpally, Nizamabad

**Faculty of Science**

**B.Sc. III Year ZOOLOGY**

**V – SEMESTER Paper – VII (Elective-II)**

**Applied Zoology**

**MODEL PAPER (Theory)**

**Time: 3 hrs**

**Max. Marks: 80**

**Note :Draw labelled diagrams wherever necessary**

**Section- I (Marks: 5x4=20)**

**Answer any FIVE of the following questions (Short Answer)**

1. Preservation techniques of fishes
2. Viral diseases in poultry
3. Nursery ponds
4. Economic importance Apiculture
5. Induction of early puberty
6. Explain social organization of Bee colony
7. Write a brief note the significance of Animal Husbandry
8. Explain briefly about Transportation of Fish seed

**Section- II (Marks: 4x15=60)**

**Answer the following questions (Long Answer) .**

9a). What is Apiculture? Explain different methods of extraction of Honey

OR

b).Write about Silk worm rearing technology

10a). Write about the general account of Economic importance Vermiculture

OR

b).What is Hypophysation? Explain in detail about induced breeding in fishes

11a). Describe verminculture technique and their significance

OR

b).Explain about breeding and management of Broilers

12a). Describe the life history of Bombyx mori

OR

b).Describe in detail about preservation and artificial insemination in cattle



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**B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**  
**V – SEMESTER**  
**Paper – VII (Elective –II)**  
**Applied Zoology**

**Periods: 30 (2 hrs/week)**

**Max. Marks: 50**

1. Identification and study of important cultivable and edible fishes - Any five
2. Identification and study of important cultivable and edible crustaceans - Any five
3. Identification different larvae of silk worm- Using specimens / pictures
4. Identification of mulberry and non mulberry silkworms
5. Mounting of mouth parts of adult silk worm and silk gland of larva
6. Estimation of quality of milk from different dairy farm units – specific gravity, fat content, pH viscosity.
7. Identification of purity of Honey in different samples
8. Field visits to a Vermiculture / Sericulture / fisheries / apiculture / poultry / dairy farmsubmission of any 3 Reports

- Laboratory Record work shall be submitted at the time of practical examination
- Computer aided techniques should be adopted as per UGC guide lines.



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**B.Sc. III Year PRACTICAL MODEL PAPER**  
**V – SEMESTER Paper – VII (Elective-II)**  
**Applied Zoology**  
**MODEL PAPER**

**Time: 3 Hrs.**

**Max. Marks: 50**

1. Identification, labeled diagram and salient features of spots: ----- 15

(05 spots)

2. Identification ----- 09

3. Field trip reports (3) ----- 12

4. Project Work ----- 07

5. Certified practical record ----- 05

6. Viva voce ----- 04





Telangana university, Dichpally, Nizamabad

## **B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**(With effect from 2018-19)**

**VI- SEMESTER**

**Core Paper – VI**

**Immunology and Animal Biotechnology**

**Periods: 45 (3hrs/week)**

**Max. Marks: 100**

### **UNIT – I (11 Periods)**

#### **1. Immunology - I**

- 1.1. Basic concepts of immunology.
- 1.2. Cells of immune system
- 1.3. Primary and secondary Organs of immune system
- 1.4. Types of Immunity – Innate and acquired

### **UNIT – II (11 Periods)**

- 1.5. Antigens and antibodies . Basic properties of antigens
- 1.6. Structure, function and types of an antibody.
- 1.7. B and T cell epitopes, haptens, adjuvants.
- 1.8. Antigen-antibody reactions,
- 1.9. T-Cell and B-Cell activation
- 1.10. Monoclonal antibodies and their production

### **UNIT – III (15 Periods)**

#### **2. Immunology - II**

##### **2.1. Working of an Immune system**

- 2.2. Structure and functions of major histocompatibility complex.
- 2.3. Basic properties and functions of Cytokines, Interferons and complement proteins
- 2.4. Humoral and Cell mediated immunity.

##### **2.5. Immune system in health and disease**

- 2.6. Types of hyper sensitivity.
- 2.2.2. Concepts of autoimmunity and immunodeficiency.
- 2.7. Introduction to Vaccines and types of Vaccines

### **UNIT – III (12 Periods)**

#### **3. Animal Biotechnology -I**

- 3.1. Concept and Scope of Animal Biotechnology.
- 3.2. Cloning vectors - Plasmids, Cosmids, Lambda bacteriophage, YAC,
- 3.3. Cloning- Cloning methods (Cell, Animal and Gene cloning)
- 3.4. Animal Cell culture - Equipment and materials for animal cell culture, Applications of cell culture techniques



## UNIT – IV (11 Periods)

### 4. Animal Biotechnology -II

3.5. Recombinant DNA technology and its applications

3.6. Transgenesis – Methods of Transgenesis.

3.7. Production of Transgenic animals and Application of Transgenic animals in Biotechnology.

3.8. Stem cells –types and their applications

### Suggested Readings

1. Arthur C. Guyton MD, A Text Book of Medical Physiology, Eleventh ed., John E. Hall, Harcourt Asia Ltd.

2. William F. Ganong, A Review of Medical Physiology, 22 ed, McGraw Hill, 2005

Sherwood, Klandrof, Yanc, Human Physiology, Thompson Brooks/Coole, 2005.

3. Knut Schmidt-Nielson, Animal Physiology, 5th ed, Cambridge Low Price Edition.

4. Richard A. Glodsky, Thomas J Kind, Barbara A. Osborne, Janis Kuby, Immunology, 5th ed,

5. Freeman and Co. New York]

6. Ivan Roitt, Immunology, 4th ed, Johanthan Brostoff, Mosby, London.

7. Thomas C. Chung, General Parasitology, Hardcourt Brace and Co Ltd. Asia. New Delhi.

8. Gerard D. Schmidt and Larry S Roberts, Foundations of Parasitology, McGraw Hill

9. Kindt, T. J., Goldsby, R. A., Osborne, B. A., Kuby, J. (2006). VI Edition. Immunology. W.H. Freeman and Company.

10. Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I.M. (2006). XI Edition. Roitt's Essential Immunology, Blackwell Publishing.

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**B.Sc. III YEAR ZOOLOGY**  
**VI - SEMESTER      Core Paper – VI**  
**Immunology and Animal Biotechnology**  
**MODEL PAPER**

**Time: 3 hrs**

**Max. Marks: 80**

**Section- I (Marks: 5x4=20)**

Answer any FIVE (Short Answer) of the following. Draw labelled diagrams wherever necessary

1. Cell Culture techniques
2. Restriction Enzymes
3. Immunoglobulin –G (Ig-G)
4. Explain the cell mediated immunity.
5. r-DNA Technology
6. Explain basic properties of Antigens
7. Write a brief note the significance of Biotechnology
8. Explain briefly about Gene therapy

**Section- I (Marks: 4x15=60)**

Answer any FOUR (Long Answer) of the following Draw labelled diagrams wherever necessary

9 a). What is immunity? Explain different types of Immunity

OR

b). Write about the antigen and antibody reactions

10a). Write about the general account of vaccines

OR

b). What is Hypersensitivity? Explain in detail about Hypersensitivity

OR

11a). Define cloning Vector. Describe any two cloning vectors and their significance  
Or

b). What is Transgenesis? Explain any two methods in processing Transgenic animals

12a). Define a stem cell. Describe the applications of Stem cells

OR

b). Describe in detail about PCR technology



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**B.Sc. III Year PRACTICAL SYLLABUS**

**VI- SEMESTER Core Paper – VI**

**Immunology and Animal Biotechnology**

**Periods: 30 (2 hrs/week)**

**Max. Marks: 50**

**I. Immunology**

1. Identification of Blood groups
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Enumeration of RBC & WBC from a given blood sample
4. Enumeration of Differential count of WBC from a given blood sample
5. Demonstration of a. ELISA b. Immuno-electrophoresis
6. Identification of Autoimmune disease through charts.

**II. Animal Biotechnology**

1. Study the following techniques through photographs / virtual lab
  - a. Southern blotting
  - b. Western blotting
  - c. DNA sequencing (Sanger's method)
  - d. DNA finger printing e. Identification of Vectors f. Identification of Transgenic animals
2. PCR demonstration /virtual lab

☐ Laboratory Record work shall be submitted at the time of practical examination

☐ Computer aided techniques should be adopted as per UGC guide lines.

**Suggested manuals**

1. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). Immunology, VI Edition. W.H. Freeman and Company.
2. David, M., Jonathan, B., David, R. B. and Ivan R. (2006). Immunology, VII Edition, Mosby, Elsevier Publication.
3. Abbas, K. Abul and Lichtman H. Andrew (2003.) Cellular and Molecular Immunology. V Edition. Saunders Publication.



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**B.Sc. III Year PRACTICAL MODEL PAPER**

**VI- SEMESTER      Core Paper – VI**

**Immunology and Animal Biotechnology**

**Time: 3 Hrs.**

**Max. Marks: 50**

1. Identification, labeled diagram and salient features of spots: ----- 15      (05 spots)
2. Identification/Determination from Immunology ----- 07
3. Identification/Study the technique from Anima Biotechnology ----- 07
4. Demonstration of a technique ----- 07
5. Project Work ----- 07
6. Certified practical record ----- 05
7. Viva voce ----- 02



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**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**Subject : Zoology**

**VI - SEMESTER      Paper VIII ( Open Elective-I )  
CLINICAL SCIENCE**

**Periods: 45 (3hrs/week)**

**Max. Marks: 100**

**UNIT – I (11 Periods)**

**1. HAEMATOLOGY**

- 1.1. Introduction of Haematology
- 1.2. Structure, Composition and functions of blood
- 1.3. Origin of blood cells (RBC, WBC, PLATELETS)
- 1.4. Blood coagulation and theories of blood coagulation, anticoagulants
- 1.5. Blood groups and Rh factor
- 1.6. Blood Transfusion and Blood Banking
- 1.7. Blood associated disorders – Anaemia, Leucopenia, Leucocytosis, Leukemia and Haemophilia

**UNIT – II (11 Periods)**

**2. IMMUNOLOGY**

- 2.1. Types of Immunity – Innate and Acquired
- 2.2. Antigens , Antibodies and Immunoglobulins – Classifications and significance.
- 2.3. Complement system.
- 2.4. Lymphatic system and Lymphoid organs – Spleen, Thymus, Lymph nodes , T-cells, B-cells and Macrophages.
- 2.5. Immune response – Humoral and cell mediated.
- 2.6. Hypersensitivity – Different types

**UNIT – III (11 Periods)**

**3. TECHNIQUES**

- 3.1. Microscopy – Light, phase contrast and Electron Microscopy
- 3.2. Microtomy- Fixation, Section cutting and Staining procedures
- 3.3. Biopsy and Autopsy of normal and affected tissues
- 3.4. Histopathological manifestations in tissues.
- 3.5. Principles of Sterilization, Autoclave, Microbial plating and Antibiotic Sensitivity Tests.
- 3.6. Immunological techniques – Agglutinations, precipitation, complement fixation test and ELISA

**UNIT – IV (12 Periods)**

**4. PATHOLOGY AND DISEASES**

- 4.1. Introduction to pathology – Definition, Scope and branches
- 4.2. Health and disease, Types of diseases
- 4.3. Bacterial diseases (Leprosy, Tuberculosis, Syphilis, Rickettsia and Spirochaete diseases).
- 4.4. Viral diseases (Dengue, Hepatitis, Swine flu, Chikun gunya, AIDS).



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- 4.5. Protozoan diseases (Trypanosomiasis, Amoebiasis, Giardiasis, Toxoplasmosis).
- 4.6. Helminth diseases (Schistosomiasis, Echinococcosis, Dracunculosis, Ancylostomiasis).
- 4.7. Fungal diseases.

#### **REFERENCES**

- 1. Textbook of Microbiology – R. Anantharayan and CKJ. Paniker
- 2. A hand book of Medical laboratory technology – V.H. Talib
- 3. Medical Laboratory technology – (vol-I & vol-II) – Kanai.L. Mukherjee
- 4. Medical Zoology-Sobti
- 5. Medical Laboratory Technology-Ramnik Sood
- 6. Parasitology – Chatterjee
- 7. Parasitology – Chakraborty.



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**B.Sc. III Year PRACTICAL SYLLABUS**

**Subject :ZOOLOGY**

**VI - SEMESTER Paper – VIII ( Open Elective-I )**

**CLINICAL SCIENCE**

**Periods: 30 (2 hrs/week)**

**Max. Marks: 50**

**I. Clinical Haematology**

1.1. Total blood count a) RBC, b) WBC, c) Platelets

1.2. Differential Leucocyte count

1.3. Estimation of Haemoglobin 1.4. Erythrocyte sedimentation rate

1.5. Packed cell volume and Erythrocyte Indices (MCV, MCH & MCHC)

1.6. Bleeding and clotting time

1.7. Blood grouping

**II. Estimation of Blood sugar and serum proteins**

**III. Preparation of blood & faecal smear and identification of protozoan & Helminth parasites**

**IV. Urine Analysis – Physical, Chemical and Microscope Examination.**

**V. WIDAL and VDRL tests.**





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**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**Subject : Zoology**

**VI - SEMESTER      Paper VIII (Open Elective-I)  
CLINICAL SCIENCE**

**MODEL PAPER**

**Time: 3 hrs**

**Max. Marks: 80**

Note : Draw labelled diagrams wherever necessary

**Section –I (5X4=20 Marks)**

I. Answer any FIVE of the following questions

1. I Unit
2. I Unit
3. II Unit
4. II Unit
5. III Unit
6. III Unit
7. Unit IV
8. Unit IV

**Section- II (Marks: 4x15=60)**

II. Answer any FOUR (Long Answer) of the following questions

9a). I Unit

OR

b). I Unit

10a). II Unit

OR

b). II Unit

11a). III Unit

OR

b). III Unit

12a). IV Unit

OR

b). IV Unit



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## **B.Sc. III Year SYLLABUS UNDER CBCS**

**Subject : Zoology**

**VI - SEMESTER Paper – VIII (Open Elective -II)**

### **AQUATIC BIOLOGY**

**Periods: 45 periods (3hrs/week)**

**Max. Marks: 100**

#### **UNIT – I (15 periods)**

##### **1. Aquatic Biomes**

- 1.1 Brief introduction of the aquatic biomes
- 1.2 Freshwater ecosystem (lakes, wetlands, streams and rivers),
- 1.3 Estuaries, intertidal zones,
- 1.4 Oceanic pelagic zone, marine benthic zone.
- 1.5 Coral reefs

#### **UNIT – II (15 periods)**

##### **2. Fresh water Biology**

- 2.1. Lakes: Origin and classification of lakes,
- 2.2. Lake as an Ecosystem, Lake morphometry,
- 2.3. Physico-chemical Characteristics of fresh water bodies: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity: dissolved gases (Oxygen, Carbon dioxide).
- 2.4. Nutrient Cycles and Lakes- Nitrogen, Sulphur and Phosphorous.
- 2.5. Streams: Different stages of stream development, Physico-chemical environment, adaptation of hill-stream fishes.

#### **UNIT – III (11 periods)**

##### **3. Marine Biology**

- 3.1. Salinity and density of sea water,
- 3.2. Continental shelf,
- 3.3. Adaptation of deep sea organisms
- 3.4. Sea weeds.

#### **UNIT – IV (12 periods)**

##### **4. Management of Aquatic Resources**

- 4.1. Aquatic pollution - Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills,
- 4.2. Eutrophication
- 4.3. Management and conservation
- 4.4. Water pollution acts of India
- 4.5. Sewage treatment and water quality assessment - BOD and COD.



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**B.Sc. III Year PRACTICAL SYLLABUS**

**Subject :ZOOLOGY**

**VI - SEMESTER Paper – VIII (Open Elective-II)  
AQUATIC BIOLOGY**

**Periods: 30 (2hrs/week)**

**Max. Marks: 50**

1. Study of the topography of a lake
2. Physico-Chemical and biological analysis of a lake Physico-Chemical analysis of water - O<sub>2</sub>, CO<sub>2</sub>, BOD, COD Biological– Zooplanktons – Identification and population density of Zooplanktons of a lake
3. Determination of - Turbidity / transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake / water body.
4. Instruments used in limnology (secchi disc, van dorn bottle, conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant / Marine bio-reserve/Fisheries Institutes.

**Suggested Readings**

1. Ananthakrishnan : Bioresources Ecology 3rd Edition
2. Goldman – Limnology, 2nd Edition
3. Odum and Barrett – Fundamentals of Ecology, 5th Edition\
4. Pawlowski: Physicochemical Methods for water and Wastewater Treatment, 1st Edition
5. Wetzel: Limnology, 3rd edition
6. Trivedi and Goyal: Chemical and biological methods for water pollution studies Welch: Limnology Vols.I-II



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**B.Sc. III Year SYLLABUS UNDER CBCS**

**Subject : Zoology**

**VI - SEMESTER Paper – VIII (Open Elective -II)**

**AQUATIC BIOLOGY**

**MODEL PAPER**

**Time: 3 hrs**

**Max. Marks: 80**

Note : Draw labelled diagrams wherever necessary

**Section –I (5X4=20 Marks)**

I. Answer any FIVE of the following questions

1. I Unit
2. I Unit
3. II Unit
4. II Unit
5. III Unit
6. III Unit
7. Unit IV
8. Unit IV

**Section- II (Marks: 4x15=60)**

II. Answer any FOUR (Long Answer) of the following questions

9a). I Unit

OR

b). I Unit

10a). II Unit

OR

b). II Unit

11a). III Unit

OR

b). III Unit

12a). IV Unit

OR

b). IV Unit