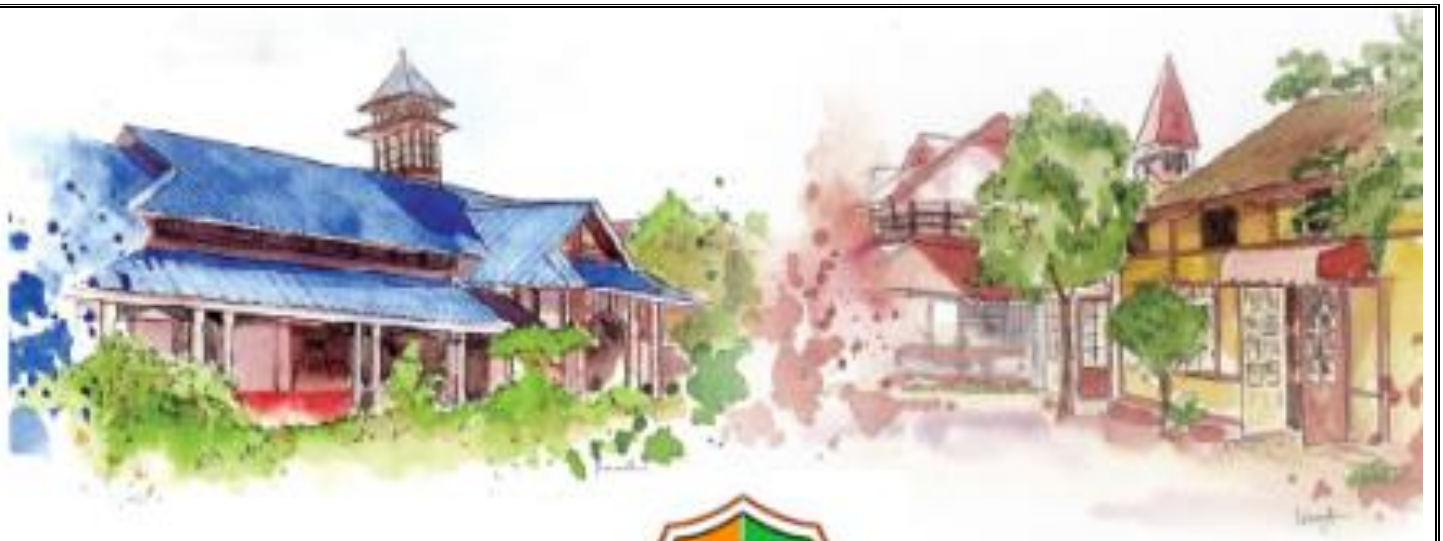

अप्रमत्तेन वेद्धव्यम्

# Four-Year Undergraduate Programme (FYUGP)

Under the

National Education Policy, 2020

## Department of Zoology

## Cotton University

## Course: Zoology Core

## Paper Code: ZOO-101C

## Paper Title: Introductory Animal Biology, Systematics, Animal Diversity (I) : Non Chordates, Functional biology of Non-chordates

**Total no. of Lectures: 48** **Credit: 3+0+1= 4**

**Theory** **Credit: 3**

**Unit 1: Introductory Animal Biology** **8L**

a) Water and life, Properties of water and role of water in life, b) Properties and significance of carbon in life, c) Prokaryotic and Eukaryotic cells, **d)** Symmetry, e) Early development: Protostome and Deuterostome, f) Body cavities: Acoelomate, Pseudocoelomate, Coelomate and Enterocoelomate, g) Homology and Analogy.

**Unit 2: Taxonomy and Systematics** **8L**

a) Definition of Taxonomy and relationship with Systematics. Application of taxonomy, b) Newer trends in taxonomy - chemo-, cyto- and molecular taxonomy, c) Zoological Nomenclature: Binomial and Trinomial Nomenclature, d) International Code of Zoological Nomenclature (ICZN): Origin, Components and Rules of Nomenclature, e) Taxonomic hierarchy(Linnaean hierarchy), f) Species concept, supra - infra specific and sibling species.

**Unit 3 : Animal Diversity – I (Non Chordates)** **16L**

**3.1 Protozoa** –
a) General characters and classification upto orders with examples, b) Type study : *Amoeba and Paramecium*, c) Life cycle and pathogenecity of *Plasmodium vivax*.

**3.2 Metazoa-**
a) Evolution of metazoan, b) Metamerism of metazoan and its significance.

**3.3 Porifera –**
a) General characters and classification upto orders with examples.

**3.4 Cnidaria –**
a) General characters and classification up to orders with examples, b) Type study: Obelia, polymorphism in Siphonophora, c) Diversity of coral and coral reefs formations.

**3.5 Ctenophora-**
a) General characteristics b) Difference between Cnidaria and Ctenophora.

**3.6 Annelida**
a) General characters and classification upto orders with examples.

**3.7: Arthropoda**
a) General characters and classification upto orders with examples in Arthropoda, b) Social life of Honey bees.

**3.8: Onycophora**
a) General Characters and evolutionary significance of Onycophora, b) Structure (Anatomical peculiarities) and affinities of Onycophora (Peripatus).

**3.9: Mollusca**

a) General characters and classification of Mollusca upto orders with examples.

**3.10 Echinodermata**

1. General characters and classification of Echinodermata upto orders with examples.

**Unit 4: Functional biology of Non-chordates** **16L**

a) Nutrition, Locomotion and Reproduction in Protozoa, b) Canal system in Porifera (Sponges), c) Excretory organ and mechanism of excretion in Annelids and Arthropods, d) Respiration in Arthropoda, e) Torsion and Detorsion in Gastropoda, f) Foot modifications in Mollusca, g) Larval forms of Mollusca and evolutionary significance (trochophore larva), h) Water Vascular System in Asteroidea, i) Larval forms of Echinodermata, j) Respiratory pigments of Non-chordates.

**Practical** **Credit: 1**

1. Study and classification of invertebrates (Museum specimen):
   Porifera - *Grantia, Sycon, Spongilla, Obelia,*
   Coelenterata - *Physalia, Aurelia, Metridium, Pennatula, Gorgonia, Medrepora*
   Platyhelminthes - *Dugesia, Taenia, Fasciola*
   Aschelminthes - *Ascaris*
   Annelida-*Aphrodite, Nereis, Heteronereis, Chaetopterus, Pheretima, Hirudinaria*
   Arthropods-*Limulus, Balanus, Cancer, Scolopendra, Julus,* Queen termite, Stick insect, *Lepisma,* Praying mantis, *Peripatus.*
   Mollusca- *Chiton, Unio, Octopus, Loligo, Mytilus, Dentalium, Pinctada.*
   Echinodermata- *Asterias, Echinus, Cucumaria, Ophiura, Clypeaster.*
2. Identification of permanent whole mount preparation: (*Amoeba, Euglena, Paramecium, Entamoeba*).
3. Study of: sponge spicules and gemmules from slide.
4. Permanent staining and mounting of specimens-*Euglena,Paramaecium, Obelia* colony, *Cyclops, Daphnia*.
5. Study of T.S. through pharynx, gizzard and typhlosolar intestine of earthworm through permanent slides.
6. Temporary mount: mouth parts of housefly and mosquito.
7. Study of larval forms: Nauplius,Trochophore, Bipinnaria,Ophiopluteus, Pluteus, Echinopluteus.

** **Lab notebook with labelled diagrams, methods (wherever applicable) and results must be incorporated.**

**Books Recommended :**


1. Dalela & Sharma: Animal Taxonomy and Museology (1976, Jai Prakash Nath).
2. Kapoor: Theory and Practicals of Animal Taxonomy (1988, Oxford & IBH).
3. Jordan. K. and P. S. Verma, Invertebrate Zoology, S Chand and Co. Ltd.
4. Modern text book of Zoology,Invertebrates,R. L. Kotpal, Rastogi Publications.
5. F. C. Majupuria-Invertebrate Zoology,Vol I.
6. E. L. Jordan and Dr. P. S. Verma, Invertebrate Zoology, S Chand and Co. Ltd.


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# Course: Zoology Minor

## Paper Code: ZOO-101M

## Paper Title: Introductory Animal Biology, Systematics, Animal Diversity (I): Non Chordates, Functional biology of Non-chordates

**Total no. of Lectures: 48** **Credit: 3+0+1= 4**

**Theory** **Credit: 3**

**Unit 1: Introductory Animal Biology** **8L**

a) Water and life, Properties of water and role of water in life, b) Properties and significance of carbon in life, c) Prokaryotic and Eukaryotic cells, d) Symmetry, e) Early development: Protostome and Deuterostome, f) Body cavities: Acoelomate, Pseudocoelomate, Coelomate and Enterocoelomate, g) Homology and Analogy.

**Unit 2: Taxonomy and Systematics** **8L**

a) Definition of Taxonomy and relationship with Systematics. Application of taxonomy, b) Newer trends in taxonomy – chemo-, cyto- and molecular taxonomy, c) Zoological Nomenclature: Binomial and Trinomial Nomenclature, d) International Code of Zoological Nomenclature (ICZN): Origin, Components and Rules of Nomenclature, e) Taxonomic hierarchy(Linnaean hierarchy), f) Species concept, supra - infra specific and sibling species.

**Unit 3: Animal Diversity – I (Non Chordates)** **16L**

**Protozoa** –
a) General characters and classification upto orders with examples, b) Type study: *Amoeba and Paramecium*, c) Life cycle and pathogenecity of *Plasmodium vivax*.

**Metazoa-**
a) Evolution of metazoan, b) Metamerism of metazoan and its significance.

**Porifera –**
a) General characters and classification upto orders with examples.

**Cnidaria –**
a) General characters and classification up to orders with examples, b) Type study: *Obelia*, polymorphism in Siphonophora, c) Diversity of coral and coral reefs formations.

**Ctenophora-**
a) General characteristics b) Difference between Cnidaria and Ctenophora.

**Annelida-**
a) General characters and classification upto orders with examples.

**Arthropoda-**
a) General characters and classification upto orders with examples in Arthropoda, b) Social life of Honey bees.

**Onycophora-**
a) General Characters and evolutionary significance of Onycophora, b) Structure (Anatomical peculiarities) and affinities of Onycophora (Peripatus).

**Mollusca-**

a) General characters and classification of Mollusca upto orders with examples.

**Echinodermata-**

1. General characters and classification of Echinodermata upto orders with examples.

**Unit 4: Functional biology of Non-chordates** **16L**

a) Nutrition, Locomotion and Reproduction in Protozoa, b) Canal system in Porifera (Sponges), c) Excretory organ and mechanism of excretion in Annelids and Arthropods, d) Respiration in Arthropoda, e) Torsion and Detorsion in Gastropoda, f) Foot modifications in Mollusca, g) Larval forms of Mollusca and evolutionary significance (trochophore larva), h) Water Vascular System in Asteroidea, i) Larval forms of Echinodermata, j) Respiratory pigments of Non-chordates.

**Practical** **Credit: 1**

1. Study and classification of invertebrates (Museum specimen):
   Porifera - *Grantia, Sycon, Spongilla, Obelia,*
   Coelenterata - *Physalia, Aurelia, Metridium, Pennatula, Gorgonia, Medrepora*
   Platyhelminthes - *Dugesia, Taenia, Fasciola*
   Aschelminthes - *Ascaris*
   Annelida-*Aphrodite, Nereis, Heteronereis, Chaetopterus, Pheretima, Hirudinaria*
   Arthropoda-*Limulus, Balanus, Cancer, Scolopendra, Julus,* Queen termite, Stick insect, *Lepisma,* Praying mantis, *Peripatus.*
   Mollusca- *Chiton, Unio, Octopus, Loligo, Mytilus, Dentalium, Pinctada.*
   Echinodermata- *Asterias, Echinus, Cucumaria, Ophiura, Clypeaster*
2. Identification of permanent whole mount preparation: (*Amoeba, Euglena, Paramecium, Entamoeba*).
3. Study of: sponge spicules and gemmules from slide.
4. Permanent staining and mounting of specimens-*Euglena,Paramaecium, Obelia* colony, *Cyclops, Daphnia.*
5. Study of T.S. through pharynx, gizzard and typhlosolar intestine of earthworm through permanent slides.
6. Temporary mount: mouth parts of housefly and mosquito.
7. Study of larval forms: Nauplius,Trochophore, Bipinnaria,Ophiopluteus, Pluteus, Echinopluteus.

** **Lab notebook with labelled diagrams, methods (wherever applicable) and results must be incorporated.**

**Books Recommended :**


1. Dalela & Sharma: Animal Taxonomy and Museology (1976, Jai Prakash Nath).
2. Kapoor: Theory and Practicals of Animal Taxonomy (1988, Oxford & IBH).
3. Jordan. K. and P. S. Verma, Invertebrate Zoology, S Chand and Co. Ltd.
4. Modern text book of Zoology,Invertebrates,R. L. Kotpal, Rastogi Publications.
5. F. C. Majupuria-Invertebrate Zoology,Vol I.
6. E. L. Jordan and Dr. P. S. Verma, Invertebrate Zoology, S Chand and Co. Ltd.


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# Course: Zoology

## Paper Code: ZOO-MDE1

## Paper Title: Food, Nutrition and Health

**Total no. of Lectures: 32** **Credit: 2+0+1=3**

**Theory** **Credit: 2**

**Unit 1: Basic concept of Food and nutrition** **9L**

Food composition, Balanced Diet, Food pyramid, Nutrient need for various groups: Children, Adolescents, Adults, Pregnant and nursing mother and Elderly, Recommended dietary allowances, Assessment of nutritional status, Food as medicine, Allergenic food

**Unit2: Nutritional Biochemistry** **9L**

Carbohydrate, Protein, Lipid: Chemical composition, Classification, Dietary source and their functional role; Micronutrients-Vitamins, minerals and their biological significance

Deficiency disorders: Major Nutritional problems- Protein energy malnutrition (Kwashiorkor, Marasmus), Anaemia, Vitamin A deficiency, Iodine deficiency disorder

Life style related diseases: Hypertension, Diabetes, Obesity-Prevention and management

**Unit 3: Food Hygiene** **8L**

Food spoilage, causes and preventive measures; Food Poisoning, Food and water borne diseases-Bacterial, Viral, Protozoan, Helminths, Causes, pathogenesis, symptoms and prevention; Food quality control techniques and adulteration in Food

**Unit 4: Food processing** **6L**

Food preparation methods (boiling, roasting, frying, sautéing, baking), Food preservation methods (canning, pickling, drying, roasting, freezing), Microorganisms important in food (Prebiotic and probiotic), Value addition processing of food

**Practical** **Credit: 1**

1. Preparation of diet list for different age group based on secondary data sources.
2. Preparation of different nutritional components in different packaged food items and their comparative analysis (theoretical)
3. Estimation of Carbohydrate and protein in different food items
4. Estimation of Iron in food
5. Detection of adulteration in food (Ghee, sugar, tea leaves, turmeric, mustard oil)
6. Gram staining of bacteria

**Recommended Reading**


1. Food Science By B. Srilakshmi
2. Food, Science and Nutrition. (2018), Sunetra Roday, Oxford University Press
3. Food, nutrition and Health. (2019), Beena Mathur, Rastogi Publications
4. Complete Book on Health and Nutrition. (2017). Dr. Walied Khawar Balwan,
5. Dietetics. (2019). B Srilakshmi , Vikas Book House, Pune.


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## Course: Zoology

### Paper Code: ZOO-SEC1

### Paper Title: Seribiology and Sericulture Practices

**Total no. of Lecture: 16** **Credit: 1+1+1=3**

**Theory** **Credit:1**

**Unit 1: Introduction** **5L**

Concept: Sericulture, Seribiodiversity, Seribiology, Seribiotechnology; History: History of Sericulture, Silk route, History of sericulture in Assam; Sericulture Organization: Central Silk Board of India, Sericulture department of Government of India and Government of Assam, Types of silk insects: Mulberry and Non-Mulberry silk insects and their distribution.

**Unit2: Biology of Silkworm** **6L**

Host plants: Host/Food plants of Major sericigenous insects (at least 4), distribution, cultivation and management; Life cycle: Mulberry, Muga, Eri and Tasar, rearing appliances, Pest and predators of silkworm and their management

**Unit 3: Post Cocoon Technology** **5L**

Preparation of cocoons for degumming, Silk reeling, Role of Silk other than in textile industry; Entrepreneurship development; Sericulture and Women empowerment

**Experiential learning** **Credit: 1**
**(No. of hours: 16)**

- Rearing of Eri silkworm
- Making handicrafts from waste cocoons

**Practical** **Credit: 1**

1. Identification of rearing appliances
2. Study of silkworm life cycle
3. Field visit and report submission

**Recommended Books:**


1. Sericulture with special reference to Assam. (2022), Tarali Kalita, North East Publishers, Guwahati, Assam.
2. A textbook on sericulture training. (2012), Amardev Singh, Oberoi book service.
3. Handbook of sericulture. (2019), Mukerji Nitya Gopal, Bangal secretariat book deport, Kolkata.
4. Application of Biotechnology in Sericulture.(2010), V. Shyam Kumar, Venkatesh Kumar R.
5. Vinesh A Text Book Of Sericulture (Skill Enhancement Course). (2020), Dr. Hem Raj , S. Dinesh & Company


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# SEMESTER II

# Course : Zoology Core

## Paper Code : ZOO-201C

## Paper Title: Chordate diversity and their functional biology, Comparative anatomy and Histology

**Total no. of Lectures: 48** **Credit: 3+0+1= 4**

**Unit 1 : Introduction to Chordates**
**8L**

General characteristics and classification of Chordata upto order.

**1.1. Protochordata**:
a) General characteristics and classification of sub-phylum Hemichordate, Urochordata and Cephalochordata up to classes, b) Salient features and affinities of *Balanoglossus*, c) Retrogressive metamorphosis in Urochordata (Ascidia), d) Affinities of *Amphioxus*.

**1.2. Agnatha :**
a) General characters and classification of cyclostomes up to order with examples, b) Ammocoete larva and its evolutionary significance, c) Distinction between *Petromyzon* and *Myxine*.

**Unit 2 : Diversity of vertebrates**
**10L**

**2.1. Pisces :**
a) General characters and classification up to order with examples.

**2.2. Amphibia :**
a) General characters and classification up to living Orders with examples.

**2.3. Reptilia:**
a) General characters and classification up to living Orders with examples.

**2.4. Aves :**
a) General characters and classification up to living orders with examples, b) Archaeopteryx – a connecting link.

**2.5. Mammals:**
a) General characters and classification up to living orders with examples, b) Affinities of Prototheria and Marsupialia, c) Adaptive radiation w.r.t. locomotory appendages.

**Unit 3 : Functional Biology** **14L**

a) Accessory respiratory organ, osmo-regulation,Migration and parental care in fishes. b) Respiration and parental care, Neoteny and paedogenesis in Amphibia, c) Poison apparatus and Biting mechanism in Snake.d) Migration, Perching and flight mechanism in birds. e) Sense organ and their functional significance in vertebrates.

**Unit 4 : Comparative Anatomy**
**16L**
**4.1 : Integumentary system**

Comparative structure, function and derivatives of integument in amphibian, birds and mammals.

**4.2: Skeletal system**
Comparative account of the axial and appendicular skeleton in amphibia, birds and mammals.

**4.3: Digestive System**
Comparison of dentition in vertebrates.

**4.4: Respiratory system**
Comparative account of respiration through buccopharynx, skin, gills, lungs.

**4.5: Circulatory system**
Comparative account of heart and aortic arches in vertebrates

**4.6: Nervous system**
Comparative account of brain.

**4.7: Urinogenital system**
Succession of kidney in vertebrates.

**4.8: Sense organs**
Types of receptors in vertebrates.

**Practical** **Credit:1**

1. Study of Museum specimens: Identification and classification up to order. (Generic name should be given) *Balanoglossus, Herdmania, Amphioxus, Petromyzon, Myxine, Pristis, Torpedo, Hippocampus, Monopterus, , Notopterus, Rohu, Cyprinus, Hypopthelmichthys, Ctenopharyngodon, Clarius, Mystus, Nectures, Axoltol larva, Salamander, Hyla, Alytes, Chelone, , Draco, Chameleon, Naja, Hydrophis, Viper, Krait*, House sparrow, Owl, Hedgehog, Manis, Bat, Monkey.
2.Study of disarticulated skeleton of Toad, Pigeon and Guinea pig.
3.Comparative study of skull in vertebrates.
4.Temporary mounting: Placoid, Squamous and Ciliated Epithelium, Striated and non-striated muscles.
5. Permanent mounting: Cycloid, Ctenoid scales.
6. Study of histology from permanent slides: T.S. of skin, stomach, intestine, liver, lung, pancreas, kidney, ovary, testis of mammal.
7. Preparation of permanent histological slides through microtomy technique.

** **Lab notebook with labelled diagrams, methods (wherever applicable) and results must be incorporated.**

**Books Recommended :**
1. Kardong, K. V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.McGraw Hill.

2. Jordan, E.L. &Verma, P.S. (2003).Chordate Zoology. S. Chand & Company Ltd. New Delhi.

3. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. II. New Central Book Agency (p) Ltd.

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# Course : Zoology Minor

## Paper Code : ZOO-201M

## Paper Title: Chordate diversity and their functional biology, Comparative anatomy and Histology

**Total no. of Lectures: 48** **Credit: 3+0+1= 4**

**Unit 1 : Introduction to Chordates**
**8L**

General characteristics and classification of Chordata upto order.

**1.1. Protochordata**:
a) General characteristics and classification of sub-phylum Hemichordate, Urochordata and Cephalochordata up to classes, b) Salient features and affinities of *Balanoglossus*, c) Retrogressive metamorphosis in Urochordata (Ascidia), d) Affinities of *Amphioxus.*

**1.2. Agnatha :**
a) General characters and classification of cyclostomes up to order with examples, b) Ammocoete larva and its evolutionary significance, c) Distinction between *Petromyzon* and *Myxine.*

**Unit 2 : Diversity of vertebrates**
**10L**

**2.1. Pisces :**
a) General characters and classification up to order with examples.

**2.2. Amphibia :**
a) General characters and classification up to living Orders with examples.

**2.3. Reptilia:**
a) General characters and classification up to living Orders with examples.

**2.4. Aves :**
a) General characters and classification up to living orders with examples, b) Archaeopteryx – a connecting link.

**2.5. Mammals:**
a) General characters and classification up to living orders with examples, b) Affinities of Prototheria and Marsupialia, c) Adaptive radiation w.r.t. locomotory appendages.

**Unit 3 : Functional Biology** **14L**

a) Accessory respiratory organ, osmo-regulation,Migration and parental care in fishes. b) Respiration and parental care, Neoteny and paedogenesis in Amphibia, c) Poison apparatus and Biting mechanism in Snake.d) Migration, Perching and flight mechanism in birds. e) Sense organ and their functional significance in vertebrates.

**Unit 4 : Comparative Anatomy**
**16L**

**4.1 : Integumentary system**
Comparative structure, function and derivatives of integument in amphibian, birds and mammals.

**4.2: Skeletal system**
Comparative account of the axial and appendicular skeleton in amphibia, birds and mammals.

**4.3: Digestive System**
Comparison of dentition in vertebrates.

**4.4: Respiratory system**
Comparative account of respiration through buccopharynx, skin, gills, lungs.

**4.5: Circulatory system**
Comparative account of heart and aortic arches in vertebrates

**4.6: Nervous system**
Comparative account of brain.

**4.7: Urinogenital system**
Succession of kidney in vertebrates.

**4.8: Sense organs**
Types of receptors in vertebrates.

**Practical** **Credit:1**

1. Study of Museum specimens: Identification and classification up to order. (Generic name should be given) *Balanoglossus, Herdmania, Amphioxus, Petromyzon, Myxine, Pristis, Torpedo, Hippocampus, Monopterus, , Notopterus, Rohu, Cyprinus, Hypopthelmichthys, Ctenopharyngodon, Clarius, Mystus, Nectures, Axoltol larva, Salamander, Hyla, Alytes, Chelone, , Draco, Chameleon, Naja, Hydrophis, Viper, Krait*, House sparrow, Owl, Hedgehog, Manis, Bat, Monkey.
2.Study of disarticulated skeleton of Toad, Pigeon and Guinea pig.
3.Comparative study of skull in vertebrates.
4.Temporary mounting: Placoid, Squamous and Ciliated Epithelium, Straiated and non-striated muscles.
5. Permanent mounting: Cycloid, Ctenoid scales.
6. Study of histology from permanent slides: T.S. of skin, stomach, intestine, liver, lung, pancreas, kidney, ovary, testis of mammal.
7. Preparation of permanent histological slides through microtomy technique.

** **Lab notebook with labelled diagrams, methods (wherever applicable) and results must be incorporated.**

**Books Recommended :**
1. Kardong, K. V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.McGraw Hill.

2. Jordan, E.L. &Verma, P.S. (2003).Chordate Zoology. S. Chand & Company Ltd. New Delhi.

3. Sinha, K. S., Adhikari, S., Ganguly, B. B. & Bharati Goswami, B. D. (2001). Biology of Animals. Vol. II. New Central Book Agency (p) Ltd.

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## Course : Zoology

### Paper Code: ZOO-MDE2

### Paper Title: Ethnobiology of North East India

**Total no. of Lectures: 32** **Credit: 2+0+1=3**

**Theory** **Credit: 2**

**Unit 1:** **7L**

Introduction to ethnobiology and traditional knowledge: nature and characteristics, scope and importance, Indigenous Knowledge (IK), Characteristics, traditional knowledge vis-a-vis indigenous knowledge

**Unit 2:** **9L**

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, Geographical Indications (GI).value of TK in global economy, Role of Government to harness TK.

**Unit 3:** **8L**

Legal framework and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016

**Unit 4:** **7L**

Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

**Practical** **Credit: 1**

Field work: Survey of traditionally plants and animals as food and medicine and submission of report

**Reference Books:**

1) Traditional Knowledge System in India, by Amit Jha, 2009.
2) Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3) Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4) "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

**e-Resources:**

1) https://www.youtube.com/watch?v=LZP1StpYEPM
2) http://nptel.ac.in/courses/121106003/

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# Course: Zoology

## Paper Code: ZOO-SEC2

## Paper Title: Aquarium Fish Keeping and Pearl Farming

**Total no. Lectures: 32** **Credit: 2+1=3**

**Theory** **Credit: 2**

**Part: 1 Aquarium Fish Keeping**

**Unit 1: Introduction to Aquarium Fish Keeping and Biology of Aquarium Fishes**

1. The potential scope of Aquarium Fish Industry as a Cottage Industry, 2. Exotic and endemicspecies of Aquarium Fishes, 3. Common characters and sexual dimorphism of fresh water and Marine Aquarium tail, fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.

**Unit 2: Food and feeding of Aquarium fishes**

1. Use of live fish feed organisms, 2. Preparation and composition of fermented fish feeds.

**Unit 3: Maintenance of Aquarium**

1. General Aquarium maintenance, 2. Budget for setting up an Aquarium.

**Part: 2 Pearl Farming**

**Unit-1: General overview of pearl farming**

Introduction to pearl farming industry: History, current status, and global significance; Pearl- producing mollusks: Species identification and biology of freshwater pearl mussels (Unionidae); Foods, breeding, growth, and maintenance of pearl-producing mussels; Soil and water quality forpearl farming; Pearl anatomy and formation: Understanding the process of pearl formation.

**Unit-2: Advance method of pearl farming**

Surgical procedures: Nucleus preparation, designer and round pearl surgery, post operative care, pond/tank culture of implanted mussels; nutritional supplements for quality pearl production; Harvesting and grading of pearls; Predators and diseases: Types and their control measures; Business planning and financial management: Principles of setting up and managing a pearl farming venture.

**Practical** **Credit: 1**

1. Identification of Indigenous ornamental fish species of Assam (atleast 10).
2. Identification of exotic ornamental (Aquarium) fish species (atleast 10).
3. Study of different components of an aquarium.
4. Identification of natural food of Aquarium fishes (from prepared slides of phyto and zoo-plankton.
5. Freshwater mussel's food preparation: Culture of phytoplanktons and zooplanktons in laboratory condition (Field visit and sample collection).
6. Freshwater mussel's collection, sorting and anatomical structure identification.
7. Preparation of nucleus: Designer, round, half round and MOP
8. Surgical procedures: Designer and round pearl surgery

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