




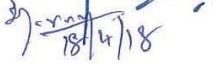
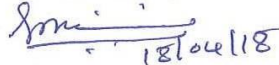








**PG AND RESEARCH DEPARTMENT OF ZOOLOGY  
RAJAH SERFOJI GOVERNMENT COLLEGE (Autonomous)  
THANJAVUR 613005**

**BOARD OF STUDIES MEETING  
18.04.2018**

The meeting of Board of Studies (BoS) in Zoology was held on 10.30 am on 18.04.2018 (Wednesday) at the department of Zoology under the chairmanship of Dr.P.Mariappan, Head, Department of Zoology. The following members are present in the meeting

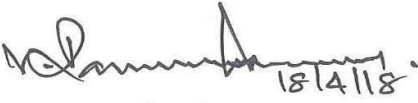




**Internal Members**

1. Dr.K.M.Subbu Rathinam
2. Dr.K.Rameshkumar
3. Dr. M.Sukumaran
4. Dr.S.Babu
5. Dr.S.Sivasuriyan
6. Dr.M.Thangadurai
7. Dr.P.Murugaian
8. Mr.S.Ramanathan
9. Dr. P.Raja
10. Dr.M.Sundaramoorthy
11. Dr. S.Ravikumar
12. Dr. R.Ravichelvan
13. Dr.R.Ravichandran
14. Dr.Merlin Emerald .D
15. Dr. M.Soundararajan

-   
-   
-   
-   
-   
- ARGENT -  
-   
- Anaman - hand  
-   
-   
-   
-   
-   
-   
- 

External Members

1. Prof. V.Ramasubramanian
2. Dr. B. Kadalmani
3. Dr. K. Venkatramalingam
4. Dr. S. Mohan Raj
5. Dr. T. Ravimanickam

-  18/4/18  
-  18/4/18  
-  18/4/18  
-  18/4/18  
-  18/4/18

The Syllabi for B.Sc. Zoology (Major and Allied), M.Sc. Zoology, and M.Phil. Zoology under CBCS system was discussed and correction/changes were made and finalized for the academic year 2018-2019 onwards. The finalized syllabus is approved in the meeting which is appended herewith.



(P.MARIAPPAN)  
CHAIRMAN-BoS-ZOOLOGY

**HEAD**  
PG & Research Dept. of Zoology,  
Rajah Serfoji Govt. College (Auto),  
THANJAVUR - 613 005.

Credit	5	Hours/Week	6	Sub Code	S1Z1	Semester	I
Medium of Instruction: English/Tamil						Core Course 1	

## INVERTEBRATA

(for students admitted from the academic year 2018-2019)

### Objectives:

To study the diverse forms of Invertebrate animals which belong to nine major phyla present around us. To help our students to distinguish various structure and function of Invertebrate animals and to know the evolutionary significance of them.

### Course Outcomes:

On successful completion of this course student will be able to:

- ✓ Familiarize diverse form of invertebrates animals belong to major nine phyla with classical examples.
- ✓ Gain knowledge about the type's study of each phylum external features, nutrition, locomotion and life cycle.
- ✓ Demonstrate the basic knowledge of life cycle of various parasites, ecological significance, economic importance and their special adaptation for their efficient survival.
- ✓ Critically distinguish various structure and function of invertebrate animals and their evolutionary significance.

### Unit-I

**Principles** and outline classification of Invertebrates. **Binomial nomenclature**

Phylum Protozoa: Salient features and classification up to class level with examples.

**Type Study – *Paramecium*- external features, nutrition, locomotion and reproduction.**

General Topics: Adaptation of Protozoan parasites, Life cycle of *Plasmodium*

### Unit-II

Phylum Porifera: Salient features and classification up to class level with examples. Type Study: Ascon sponge (*Leucosolenia*). General Topics: Canal system in sponges, spicules of sponges

Phylum Coelenterata: Salient features and classification up to class level with examples. Type Study: ***Obelia*- Structure of polyp, medusa and colonial organization.** GT: Corals- Coral reefs and **its importance**

### Unit-III

Phylum Platyhelminthes: Salient features and classification up to class level with examples.

Type Study: ***Taenia solium* – Structure, Scolex, metamerisim, reproduction and life cycle.**

Parasitic adaptations in Platyhelminthes. Phylum Nematoda: Salient features and classification up to class level with examples. Type Study: *Ascaris lumbricoides* and Parasitic adaptations in nematodes

### Unit-IV

Phylum Annelida: Salient features and classification up to class level with examples. Type Study: *Megascolex mauritii* (Earthworm), **external features, digestive system, excretory and**

**reproductive system.** GT: Modes of life in Annelida based on habitats. Phylum Arthropoda: Salient features and classification up to class level with examples. Type Study: *Penaeus monodon* GT: Crustacean larvae and their significances

### Unit-V

Phylum Mollusca: Salient features and classification up to class level with examples. Type Study: *Lamellidens marginalis* (Freshwater mussel), **digestive, respiratory and reproductive system.** GT: Cephalopod as an advanced mollusc.

Phylum Echinodermata: Salient features and classification up to class level with examples. Type Study: *Asterias rubens* (Star fish). General Topics: Echinoderm larvae and their significances. Water Vascular System of Echinoderms.

### Text Books

Ekambaranatha Ayyar. M and Ananthkrishnan, T.N. 2000. Manual of Zoology, Volume I – Invertebrate Zoology, KitabMahal, Allahabad.), S.Viswanathan Pvt. Ltd.

Jordan, E.L. & Verma, P.S. 2009. Invertebrate Zoology, S.Chand& Co. New Delhi.

### Reference Book

R.C.Brusca et al. 2016. Invertebrates. Sinauer Associates, an imprint of Oxford University Press.

### Question Pattern

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	3	Sub Code	S1ZP1	Semester	I
Medium of Instruction: English/Tamil						Core Course 2	

### Major Practical-I: INVERTEBRATA

(for students admitted from the academic year 2018-2019)

#### Objectives:

To impart training on the techniques of dissecting the Invertebrate animals and to understand the various systems present in their body. To train the students to discriminate the various external and internal body parts of Invertebrates. To observe the preserved animals in the museum (wet and dry) and to study their characteristic features.

#### Course Outcomes:

Upon successful completion, students will:

- ✓ Have the knowledge and skills to: understand the systemic functions, importance of selected organisms both living and preserved specimens of invertebrates.
- ✓ Develop and apply knowledge of basic laboratory skill, principle of microscopy, structural organization of mouth parts of cockroach, body setae and penial setae of the earthworms.
- ✓ Demonstrate and illustrate the various body systems (digestive and nervous) of earthworms, cockroach and prawn.

#### DISSECTIONS

**EARTHWORM:** digestive system-Nervous system

**COCKROACH:** Digestive –nervous-reproductive systems

**Prawn :** Nervous system

#### MOUNTING

Earthworm-Penial and Body setae

Prawn appendages

Mouth Parts of Cockroach, Honey bee and Mosquito

#### SPOTTERS

**PROTOZOA:** *Entamoeba histolytica*, *Euglena*, *Paramecium* (entire, binary fission and conjugation)

**PORIFERA :** *Sycon*, *Spicules* and *Gemmules*.

**COELENTERATA:** *Obelia* (entire, medusa), *Aurelia*, *Metridium* (Sea anemone).

**CORALS:** Madrepora, Tubipora, Fungia, Favia.

**PLATYHELMINTHES:** *Dugesia* (Planaria)(W.M. & T.S), *Fasciola hepatica* (Liver fluke) W.M. & T.S), Redia larva, Cercaria larva, *Taenia solium* (Tapeworm ) (W.M. & T.S) Tapeworm Scolex.

**NEMATODA:** *Ascaris lumbricoides* (Entire – Male and Female), T.S. of *Ascaris*.

**ANNELIDA:** *Nereis* (Entire) T.Sof *nereis*, Parapodium, Heteronereis, *Hirudinaria granulosa* (Leech) (Entire & T.S)

**ARTHROPODA:** *Streptocephalus*, *Daphnia*, *Cyclops*, *Lepas*, *Balanus*, *Sacculina*, *Hippa*, *Limulus*,

*Scolopendra*, Prawn.

**LARVAE:** Nauplius larva, Zoea larva, Mysis larva.

**BENEFICIAL INSECTS:** Honey bee and Silkworm

**MOLLUSCA:** Pila, Chiton, Murex, Sepia, Octopus, Nautilus, Xancus, Aplysia, Mytilus, Loligo, Cuttlebone.

**ECHINODERMATA:** Star fish, Sea urchin, Sea cucumber, Sea lilly, Pedicellaria, Bipinnaria larva,  
Ophiopluteus larva

Credit	5	Hours/Week	6	Sub Code	S2Z2	Semester	II
Medium of Instruction: English/Tamil						Core Course 3	

## CHORDATA

(for students admitted from the academic year 2018-2019)

### Objective:

To introduce the students about the diverse forms of Vertebrate animals of major classes. To help the students to distinguish various vertebrate animals and understand the evolutionary significance and their importance

### Course Outcomes:

On completion of this course the student will

- ✓ Get knowledge on classification and characteristic features of chordates
- ✓ Know the structure and its function of various organs of chordates
- ✓ Get knowledge about the birds and mammals
- ✓ Gain more information on comparative study in Chordates

### Unit-I

Outline the classification of Vertebrates. Salient features of Chordates – Prochordata - Salient features of Hemichordata. Type Study: *Balanoglossus*. Salient features of Urochordata. Type Study: Ascidian. Salient features of Cephalochordata. Type Study: Branchiostoma.

### Unit-II

Pisces-Salient features and classification up to order with examples. Shark (*Scoliodon*)-External features. Digestive, respiratory, circulatory, nervous and urinogenital system. General Topics: Migration in Fishes. Accessory respiratory organs in fishes.

### Unit-III

Amphibia: Salient features and Classification of up to order with examples. Type Study: Frog (*Rana hexadactyla*)-External features-Digestive, respiratory, nervous and urinogenital system. GT: Parental care in amphibians

Reptilia- Salient features and Classification up to orders with examples

Calotes-*Calotes versicolor* -External features, Digestive, respiratory, circulatory, nervous and urinogenital system.

GT: Golden age of reptiles. Identification of poisonous and nonpoisonous snakes.

### Unit-IV

Aves-Salient features and Classification up to orders with examples-*Columba livia*-External features, Digestive, respiratory, circulatory and urinogenital system. Migration in Birds. Flight adaptation in birds.

### Unit-V

Mammalia-Salient features and Classification up to orders with examples

Rabbit (*Oryctolagus cuniculus*)-external features- Digestive, respiratory, circulatory, nervous, excretory and reproductive system.-Comparison of Prototherians, Metatherians and Eutherians- Dentition in mammals

**Text Books**

Ekambaranatha Ayyar, M, and Ananthakrishnan, T.N. 2000. Manual of Zoology, (Volume II – Chordate Zoology.) S.Viswanathan Pvt. Ltd.

Jordan, E.L. 2007. Chordate Zoology, S. Chand & Co. New Delhi.

**Reference Books**

Pough, F.H., J.B. Heiser & W.N. McFarland, 1996. Vertebrate Life. Prentice Hall Pvt. Ltd. Pp 798.

Pough, F.H., Janis, C.M. & Heiser, J.B. 2002. Vertebrate Life. Pearson Education, Inc. Pp699.

Question Pattern

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs



Credit	4	Hours/Week	3	Sub Code	S2ZP2	Semester	II
Medium of Instruction: English/Tamil						Core Course 4	

### Major Practical – II: CHORDATA

(for students admitted from the academic year 2018-2019)

#### Objectives:

To impart training on the techniques of dissecting the vertebrate animals and to understand the various systems present in their body. To dissection of vertebrate animal's brain, digestive and Nervous system by using Computers.

#### Course Outcomes:

- ✓ Able to dissect out different systems of Chordata such as Fish, Frog, Calotes, Pigeon and Rabbit.
- ✓ Identified and Classify the specimens which are present in the department lab
- ✓ Have knowledge about the systematic position of Chordates

#### Virtual Dissections:

**Shark / Frog / Calotes/ Aves/Rat** – Digestive, Arterial, Venous & Reproductive Systems

#### Mounting:

**Shark:** Mounting of placoid scales

#### SPOTTERS:

**Prochordata:** Balanoglossus, Branchiostoma (*Amphioxus*) and Ascidian (*Herdmania*)

**Pisces:** Shark (*Scolidon sorrakowah*), Arius, Gambusia, Hippocampus, Exocoetus, Anabas, Synaptura.

**Amphibia:** Frog, Bufo, Hyla, Salamander

**Reptilia:** Hemidactylus, Draco, Varanus, Naja naja, Viper, Chelone, chamaeleon, Lycodon

**Aves:** King fisher, Pigeon, Owl, Quill feather, Synsacrum

**Mammalia:** Rabbit, Rat, Loris and Bat

**Skeletal system:** Frog, skull, Pectoral and Pelvic girdle, forelimb and hindlimb.

**Dentition:** Rabbit, Man, Dog.

Credit	5	Hours/Week	6	Sub Code	S3Z3	Semester	III
Medium of Instruction: English/Tamil						Core Course 5	

## CELL AND MOLECULAR BIOLOGY

(for students admitted from the academic year 2018-2019)

### Objectives:

By doing this course well, students will develop basic knowledge and skills in cell and molecular biology and become aware of the complexity and harmony of the cell.

### Course Outcomes:

After completion of this course, the students would have learned the following subject area well versed in the

- ✓ Principle and functions of microscope.
- ✓ Anatomy and physiology of cells and organelles.
- ✓ Ultra structural functions of nucleus with reference to chromosomes.
- ✓ Mechanisms of cell divisions.
- ✓ Types of DNA and RNA.
- ✓ Mechanisms of protein synthesis.
- ✓ Mechanisms of carcinogenesis.
- ✓ Aging and cell death. Types and mechanisms of mutation

### Unit-I

Microscopy: Compound and Electron Microscope. Cell: Introduction–Ultra-structure-Comparison between Prokaryotic and Eukaryotic cells; Plasma membrane –Ultra structure, modification of plasma membrane and its function.

### Unit-II

Ultra structure and functions of cytoplasmic organelles: endoplasmic reticulum, golgi complex, lysosome, mitochondria, ribosome, centrosome.

### Unit-III

Ultra structure and **functions** of nucleus, nucleolus and chromosomes. Giant chromosomes: polytene and lamp brush chromosomes.

Cell cycle: Mitotic and meiotic cell divisions.

### Unit-IV

Nucleic acids: DNA- Watson and Crick model, A, B and Z forms of DNA, DNA Replication.

RNA - Types, difference between RNA and DNA

Central Dogma: Synthesis of DNA, RNA and protein. Genetic code

### Unit-V

Cell Growth and Aging: Growth of cells in unicellular and multi cellular organisms–Aging and its causes–apoptosis. Cancer: Introduction-types (Carcinomas, Sarcomas, Lymphomas, Leukemia) -causes and carcinogenesis - Mutation and Viral theories of carcinogenesis

**Text Book**

Vyas, S.P. 2011. Cell and Molecular Biology. CBS Publications and Distributors Ltd.

**Reference Books**

Lewis, Keleinsmith and Valeris M.Kish. 1988. Principles of Cell Biology, Harper and Row Publication, New York.

Power, C.B 1983, Cell Biology, Himalaya Publication House, Bombay.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	3	Sub Code	S3ZP3	Semester	III
Medium of Instruction: English/Tamil						Core Course 6	

**Major Practical III: Cell and Molecular Biology**  
(for students admitted from the academic year 2018-2019)

**Course Outcomes:**

After completion of this course, the students would have learned the following subject area well versed.

- ✓ Measurement of cells.
- ✓ Staining technique for identification of different cells
- ✓ Preparation and analysis of giant chromosomes.
- ✓ Observation of cell divisions.
- ✓ Analysis of blood cells and haemocytes.
- ✓ Vaginal smear preparations and analysis.

1. Measurement of a cell by Micrometer
2. Study of prokaryotic cells using **simple** staining technique.
3. Study of eukaryotic cell using suitable staining technique (buccal epithelial Cells)
4. Mounting of Polytene chromosome in Chironomous Larva
5. Study of mitosis in onion root tip.
6. Study of meiosis in cockroach/grasshopper
7. Smear preparation of human blood/ goat
8. Smear preparation of cockroach haemolymph
9. Vaginal smear preparations in female rat

**Spotters:**

Compound Microscope, Dissection microscope, Micrometer, Camera Lucida, Centrifuge, pH meter

Simple Epithelial cells: Simple Squamous epithelium, Simple Cuboidal Epithelium, Simple Columnar Epithelium

Stratified epithelial cells: Stratified Squamous, Stratified Cuboidal, Stratified Columnar, Stratified Transitional

Pseudostratified epithelial cells: pseudo stratified columnar, pseudostratified ciliated

Credit	2	Hours/Week	2	Sub Code	S3SB1D	Semester	III
Medium of Instruction: English/Tamil						SB 1	

## AQUACULTURE

(for students admitted from the academic year 2018-2019)

### Objectives:

Ensure active student participation in activities connected with basic aquaculture practices. Provide basic understanding of biological, chemical and environmental concepts pertaining to culture aquatic organisms.

### Course Outcomes:

- ✓ Able to express the basic features of aquaculture and construction procedures for fish farms and identify different fish farming methods
- ✓ Able to manage water quality and gain knowledge of nutrition important for growth and health
- ✓ Gain knowledge about the culture techniques of major carps which helps in the production of healthy food for human consumption
- ✓ Know the causes, control and mitigation of fish disease
- ✓ detailed knowledge about harvesting, transport and preservation techniques

### Unit-I

Scope and importance of aquaculture. Current status and trend for aquaculture in world. Basic Fish farm design and construction. Types of Culture- extensive, intensive, and semi intensive culture. mono and poly culture- Monosex culture-Integrated farming-paddy cum fish culture

### Unit-II

Water quality management. Fish feed-formulation. Live feeds. Selection of candidate species for aquaculture. Cultivable species of fishes, crustaceans, molluscs and algae.

### Unit-III

Fish culture: Culture of Indian Major Carps-Catla, Rohu and Mrigal. Pearl Oyster culture. Crustacean Culture: *Penaeus* sp.

### Unit-IV

Fish diseases and management: Common bacterial, viral, fungal, protozoan and crustacean diseases, their symptoms and control measures

### Unit-V

Harvesting (gears and crafts) and transport. Preservation techniques- Canning and Freezing. By products of fishes. Marketing the fish to local markets and for export. Quality control and norms of MPEDA for export of fishes.

### Text Book:

Reddy, S.M. 2004. A Text Book of Aquaculture. Discovery Publishing Pvt. Ltd. Pp 163.

**Reference Books:**

Santhanam, R., N. Sugumaran and P. Natarajan. 1987. A manual of Freshwater aquaculture. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

Shanmugam, K. 1992. Fishery Biology and Aquaculture. Leo Pathipagam, Madras.

Jameson, J.D. and R.Santhanam (1996). Manual of ornamental fisheries and farming technology. Fisheries College and Research Institute, Thoothukudi.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	5	Hours/Week	6	Sub Code	S4Z4	Semester	IV
Medium of Instruction: English/Tamil						Core Course 7	

## ENVIRONMENTAL BIOLOGY AND EVOLUTION

(for students admitted from the academic year 2018-2019)

### Objectives:

- To study the dynamics of ecosystem, community ecology and population ecology.
- To observe the habitat ecology and environmental pollution.
- To learn the evidences of evolution, theories of evolution, speciation and fossil evidences

### Course Outcomes:

On successful completion of this course students will be able to:

- ✓ Gain consolidated knowledge about ecosystem, habitats, various factors influencing ecosystem, dynamic nature of minerals, population ecology and its balance.
- ✓ Develop their knowledge in relation to origin of life on the basis of historical prospects and scientific evidences.
- ✓ Critically evaluate and understand the concept of speciation, evolution and animal extinction.

### Unit-I

Ecology-abiotic and biotic factors-Impacts of temperature and light in living organisms. Ecosystem: Definition, classification and Structure with examples (pond, marine and forest ecosystems)-primary production-secondary production-food chain and web-tropic levels- Energy flow-Pyramid of biomass and energy.

### Unit-II

Habitat ecology: Characteristics of freshwater, marine, estuary and terrestrial habitats. Community ecology: Community structure, dominance, stratification, interdependence, ecotone, edge effect, ecological niche, ecological succession

### Unit-III

Biogeochemical cycle: carbon, nitrogen, phosphorous and sulphur cycles. Population ecology: Definition, density, estimation, natality, mortality, age distribution and age pyramid, life table, population growth, population equilibrium, biotic potential and regulation.

### Unit-IV

Origin of life-evidences of evolution-morphological, physiological, embryological and paleontological evidences. Theories of evolution: Lamarckism, Darwinism, Modern theory of evolution

### Unit-V

Species concept-speciation-factors influencing speciation-isolating mechanisms. Mimicry and Colouration-Evolution of horse and Man. Animal Extinction-reasons and effect

**Text Books**

Mohan P. Arora. 2016. Ecology. Himalaya Publishing House, Pp 554.

Mark Ridley. 2003. Evolution. Blackwell Science. Pp733.

**Reference Books**

Chapman, J.L. and M.J. Reiss. 1997. Ecology-Principles and Applications. Cambridge University Press, UK.

Odum, E.P. 1996. Fundamentals of Ecology. Nataraj Publishers, New Delhi.

Strickberger's Evolution. Brain K. Hall. 2014. Jones and Bartlett. Pp 672.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs



Credit	4	Hours/Week	3	Sub Code	S4ZP4	Semester	IV
Medium of Instruction: English/Tamil						Core Course 8	

### **Major Practical IV: ENVIRONMENTAL BIOLOGY AND EVOLUTION**

(for students admitted from the academic year 2018-2019)

#### **Objectives:**

To study the community ecosystem, water quality analysis and identification of planktons, to observe the ecological fauna, ecological instruments and homologous and analogous organs, to study mimicry and colourations, study of fossils and modification of feet and beak in birds.

#### **Course Outcomes:**

Upon successful completion, students will have the knowledge and skills to:

- ✓ Explain the structure of community in an ecosystem and their diversified life.
- ✓ Develop and apply knowledge and skills in implement experimental strategies to investigate different water quality analysis skills pertaining to ecosystem.
- ✓ Critically assess biological information and apply it to theoretical, experimental and professional contexts.
- ✓ Describe the different ecological fauna, interactions with its environment and describe the important processes like adaptations, mimicry governing the dynamics of animal communities.
- ✓ Examine, summarise and evaluate scientific evidence integrate central ideas underpinning evolutionary patterns and processes based on homologous, analogous organs and fossilization

#### **Environmental Biology**

1. Analysis of structure of community in an ecosystem
2. Estimation of dissolved oxygen
3. Estimation of salinity
4. Determination of pH in water sample
5. Estimation of alkalinity of water
6. Estimation of carbon dioxide
7. Estimation of carbonate and bicarbonate
8. Identification of fresh and marine water planktons

#### **Spotters**

Rocky, sandy, muddy shore fauna, Animal association examples

Ecological instruments: Secchi disc, pH meter, thermometer, hygrometer, plankton net

#### **Evolution**

Homologous and analogous organs

Mimicry and colorations: butter fly, stick insect, leaf insect, lycodon, lophius, Urey Miller Experiment Model

Study of fossils: Ammonite, Trilobite, Lingual, Limulus

Modification of feet and beaks in birds.

Visit to ecologically important places

Credit	2	Hours/Week	2	Sub Code	S4SB2F	Semester	IV
Medium of Instruction: English/Tamil						SB 2	

## **SERICULTURE**

(for students admitted from the academic year 2018-2019)

### **Objectives:**

To impart training on silkworm rearing, cocoon production and silk reeling from sericulture. To kindle the young minds to become an entrepreneur in sericulture.

### **Course Outcomes:**

On completion of this course the student will

- ✓ Have knowledge on the development of sericulture in the world and in India
- ✓ Know the method of mulberry plantation
- ✓ Have the idea of sericulture industry and moriculture
- ✓ Start seri-business

### **UNIT-I**

Introduction: Sericulture: Definition, history and present status; silk route. Prospects of Sericulture in India: Sericulture industry in different states of India - Mulberry and non-mulberry sericulture. Mulberry: distribution and common varieties of mulberry used in India.

### **UNIT-II**

Types of silkworms, distribution of races- exotic and indigenous races. Commercial races: Multivoltine, bivoltine, univoltine and hybrid races used in India. Morphology and Life cycle of *Bombyx mori*. Structure of silk gland and secretion of silk.

### **UNIT-III**

Silkworm rearing house and appliances: Rearing house - Early age rearing and Late age rearing. Appliances: Rearing trays, ant-wells, rearing stands and racks, paraffin papers, rubber foam pads, net, chopsticks, feathers. Types of mountages, Spinning, harvesting and storage of cocoons.

### **UNIT-IV**

Silkworm diseases: protozoan, viral, fungal and bacterial diseases and their control methods. Pests of silkworm: uzi fly, dermestid beetle-control and preventive measures.

### **UNIT-V**

Harvesting of cocoons, storing and cocoon marketing-silk tests and commercial classification. Silk reeling- Byproducts of sericulture

### **Text Books:**

Ganga, G. and Sulochana Chetty, J. 2003. An Introduction to Sericulture (2<sup>nd</sup> Edition). Oxford and IBH Publishing co. Pvt-Ltd., New Delhi.

Patnaik, R.K. 2008. Sericulture Manual. Biotech Publishers, New Delhi

Mariappan, P. 2017. Sericulture (*Pattupulu Valarppu*), Iyal Publicatins, Thanjavur. Pp 264.

**Reference Books:**

Taxima, Y. 1972. Hand Book of Silkworm Rearing. Fuji Publication, Tokyo.

FAO. 1990. Sericulture Training Manual Bulletin. FAO Agricultural Services Bulletin No. 80, FAO, Rome.

FAO. 1991. Silkworm Diseases. FAO Agricultural Services Bulletin. No. 73/4, FAO, Rome.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	5	Hours/Week	6	Sub Code	S5Z5	Semester	V
Medium of Instruction: English/Tamil						Core Course 9	

**ANIMAL PHYSIOLOGY AND BIOCHEMISTRY**  
(for students admitted from the academic year 2018-2019)

**Objectives:**

To study the structure and functions of different organs of living organism and how all these functions combine to make life growth and development. To focus how the organ, organ system, cells and bio molecules carryout the chemical function to accomplish the complex goal of sustaining life. To learn the biological phenomena at molecular level and to understand the fundamental chemical principles that govern complex biological system

**Course Outcomes:**

On completion of this course the student will have an idea in

- ✓ the digestive system and understand the general digestive process in man.
- ✓ know to excretory system, structure of Kidney and it's Function.
- ✓ know their structure of Heart, pumping mechanism and types.
- ✓ nervous system and explain the control mechanism of entire body activities.

**Unit-I**

Nutrition – Digestion, absorption and assimilation in human; Respiration - Mechanism of O<sub>2</sub> and CO<sub>2</sub> transport in human beings. Respiratory pigments in animals. Circulation-composition and functions of blood - Structure and functions of Heart - Origin and conduction of heart beat and cardiac cycle.

**Unit-II**

Excretion-Nitrogenous wastes – Ammonotelism, Ureotelism, Uricotelism – Ornithine cycle – Mammalian Kidney – Urine formation. Osmo - ionic regulation in freshwater and marine fishes. Reproduction-**Structure and functions of male and female reproductive system of human being**. Sexual cycles (estrous and menstrual)

**Unit-III**

Nervous system – types of neurons, conduction of nerve impulse, synapses, synaptic cleft, synaptic transmission, reflex action, Neurotransmitters. Receptors – Phono and photo receptors. Muscle – Types of muscles – ultra structure and physiology of muscles.

**Unit-IV**

Structure, functions and classifications of carbohydrates, proteins and lipids with examples. Metabolism–Carbohydrate, Protein and Lipid.

**Unit-V**

Vitamins- water and fat soluble vitamins – sources, functions and deficiency diseases. Enzymes – types, properties, mechanism and theories of enzyme action.

**Text Book:**

Verma, P.S., B.S. Tyagi, and V.K.Agarwal. 2017. Animal Physiology. S.Chand & Co., New Delhi. Pp 400.

**Reference Books**

Hoar W.S. 1987. General and Comparative Physiology, Prentice Hall.

Echert, R. and Randall, D. 1987. Animal Physiology, CBS Publishers and Distributors.

Lehninger L. Albert, David.L.Nelson and Michael M. Cox. 1993. Principles of Biochemistry, CBS Publishers and Distributors, New Delhi.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	5	Sub Code	S5ZP5	Semester	V
Medium of Instruction: English/Tamil						Core Course - 10	

**Major Practical V**  
**ANIMAL PHYSIOLOGY, BIOCHEMISTRY, GENETICS, MICROBIOLOGY & IMMUNOLOGY**

(for students admitted from the academic year 2018-2019)

**Course Outcomes:**

On Successful completion of course student will be able to...

- ✓ develop and apply knowledge and skills in implement experimental strategies to investigate different parameters of blood, saliva and excretory materials.
- ✓ familiarize the principle and application of various instruments pertaining to physiological
- ✓ measurement, Sterilization and vectors.
- ✓ experience the qualitative measurement of macro molecules.
- ✓ gain consolidated knowledge on Mendelian principles with a classical example of drosophila.
- ✓ able to develop hands on experience about microbial media preparation, Identification of bacteria by staining techniques and human blood grouping.

**ANIMAL PHYSIOLOGY**

Estimation of Haemoglobin.

Enumeration of RBC by haemocytometer.

Enumeration of WBC by haemocytometer.

Qualitative test for Ammonia, Urea and Uric acid.

Human salivary amylase activity in relation to pH and Temperature

**SPOTTERS**

Haemoglobinometer, Haemocytometer, Stethoscope, Sphygmomanometer, ECG, Pacemaker, pH meter, Ti plasmid, pBR322 vector, Petri plate, Autoclave, Inoculation loop and laminar flow.

**BIOCHEMISTRY**

pH measurement.

Qualitative tests for protein, carbohydrate and lipid.

Beer Lambert law verification.

**GENETICS**

Drosophila - male, female identification. Mutant varieties of Drosophila, Mendelian traits in man, Pedigree analysis, polygenic inheritance - finger print patterns

**MICROBIOLOGY AND IMMUNOLOGY**

Culture techniques - broth, slants and spread plate methods.

Motility determination by hanging drop method.

Preparation of smear, simple staining and Gram's staining.

ABO Blood grouping.

Credit	4	Hours/Week	6	Sub Code	S5ZEL1A	Semester	V
Medium of Instruction: English/Tamil						Major Elective Course 1	

## GENETICS

(for students admitted from the academic year 2018-2019)

### Objectives:

Specific objectives of this course are to provide an understanding and discuss ramifications of inheritance, gene structure, gene function, mutation, and the application of genetic principles

### Course Outcomes:

- ✓ To predict the characteristics of offspring produced by parents.
- ✓ understand the chromosome structural variation results from the chromosomal breakage.
- ✓ Know the concept of mutation they can understand the function of cells and metabolic regulations.
- ✓ By microbial genetics, the genetics of the disease causing micro organisms are identified and helpful in controlling diseases.
- ✓ By studying the XY chromosomes of human, it is clarified that male determines the sex of the offspring.

### Unit-I

Mendel's laws of inheritance, Mono and dihybrid crosses, test cross, complete and incomplete dominance, co-dominance. Interaction of genes- Epistasis, complementary genes, duplicates genes, supplementary genes, lethal genes - multiple alleles (Human Blood Group).

### Unit-II

Linkage—mechanism and types. Crossing Over—mechanism and types. Chromosome map. Numerical changes of chromosomes-euploidy, aneuploidy. Structural changes of chromosomes—deletion, duplication, translocation, inversion. Sex linked inheritance

### Unit-III

Nature of Genetic Material: evidence that DNA is the genetic material; Fine structure of gene; Gene mutations - insertion, deletion, transition (tautomerization, base analogs, deamination), transversion; spontaneous and induced mutations, mutagens. Inbreeding and out breeding. Heterosis.

### Unit-IV

Microbial Genetics: Bacterial genetics—transformation, conjugation and transduction. Plasmids; movable genes. Genetics of viruses—lytic and lysogenic cycles of phage, recombination in phage, transduction.

### Unit-V

Human chromosome and Sex determination, Mendalian phenotypic traits of man, Syndromes and metabolic disorders, polygenic inheritance, eugenics and eugenics, pedigree studies, introduction to human genome project.

**Text Book:**

Verma P.S. And V.K Agarwal. 2010. Genetics. S.Chand and Co., New Delhi. Pp 1294.

**Reference Book:**

Jocelyn E. Krebs, Elliott S. Goldstein, and Stephen T. Kilpatrick. 2018. Lewin's GENES XII. John Bartlett Learning. 838.

Daniel, L. Hartl. 1994. Genetics (III Edn) Jones and Bartlet publishers. Boston.

Elof Axel Carlson. 1985. Genetics, Tata McGraw Hill Publishing Co.

**Question Pattern**

Part A (10 x 2= 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs



Credit	4	Hours/Week	6	Sub Code	S5ZEL1B	Semester	V
Medium of Instruction: English/Tamil						Major Elective Course 1	

**MEDICAL LABORATORY TECHNIQUES**  
(for students admitted from the academic year 2018-2019)

**Objective:**

The objective of this course is to produce versatile medical laboratory technologist equipped with adequate knowledge and skills in performing various laboratory analyses and tests related to patients diagnosis and treatment and also for the prevention of disease.

**Course Outcomes:**

Upon successful completion of the Medical Laboratory Technician, the student should be able to:

- ✓ Perform routine clinical laboratory procedures within acceptable quality control parameters in Hematology, Chemistry, Immunohematology, and Microbiology under the general supervision of a Clinical Laboratory Scientist or Pathologist.
- ✓ Demonstrate technical skills, social behavior, and professional awareness incumbent upon a laboratory technician
- ✓ Operate and maintain laboratory equipment, utilizing appropriate quality control and safety procedures.
- ✓ Perform within the guidelines of the code of ethics

**Unit-I**

Introduction to Clinical laboratory. Basic laboratory principles. Code of conduct of medical laboratory personnel-The use of the laboratory-Organization of clinical laboratory and role of medical laboratory technician-Safety measures-Medical laboratory professional and professionalism in laboratory workers-clinic borne infection and personnel hygiene

**Unit-II**

Common Laboratory Equipment-Incubator, Hot Air Oven, Water Bath-Anaerobic Jar, Centrifuge, Autoclave-Microscope-Fundamentals of Microscopy, Resolution & Magnification, Light Microscopy, Electron Microscopy-Glassware-Description of Glassware, its use, handling and care

**Unit-III**

Basic Steps for Drawing A Blood Specimen Requirement of Blood Collection-Phlebotomy - Sampling errors-Collection and preservation of biological fluids-Anticoagulants-Preservation of samples-Chemical preservatives-Process of analysing the specimens-The laboratory report.

**Unit-IV**

Preparation of Reagents & Quality control. Buffer and pH-Preparation of reagents: Normal, percent and Molar solution-normal saline-Methods of measuring liquids-Clinical Laboratory records-Modern Laboratory set up-Quality control: Accuracy, Precision, and Reference values.

**Unit-V**

Manual Vs Automation in Clinical Laboratory-Types of analyzers-Semi-auto analyzer-Batch analyzer -Random Access autoanalyzers. Steps in the automated systems-Responsibilities of a technician in the maintenance of the analyzers.

**Text Books:**

J Ochei and Kolhatkar, 2002. Medical laboratory science theory and practice, Tata McGraw-Hill, New Delhi.

Kanai L. Mukherjee, 2007, Medical laboratory technology Vol.1.Tata McGraw Hill

**Reference Books:**

Fischbach, 2005. Manual of lab and diagnostic tests, Lippincott Williams Wilkins, New York.

Gradwohls, 2000. Clinical laboratory methods and diagnosis. (ed) Ales C. Sonnenwirth and Leonard Jarret, M.D.B.I., New Delhi.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	6	Sub Code	S5ZEL2A	Semester	V
Medium of Instruction: English/Tamil						Major Elective Course2	

## MICROBIOLOGY AND IMMUNOLOGY

(for students admitted from the academic year 2018-2019)

### Objectives:

General aim of this course is that the student should acquire basic knowledge in microbiology and immunology.

### Course Outcomes:

Students completing this course will be able to

- ✓ Describe the organization of microbes and basic bacterial culture techniques.
- ✓ Outline food microbiology, nitrogen and sulphur cycle and industrial microbiology.
- ✓ Summarise historical developments of immunology and immunity types.
- ✓ Appreciate lymphoid organs and immune system cells.

Outline immunoglobulins, antigen-antibody interactions, immunodeficiency disorders.

### Unit-I

Historical development of microbiology. Structural organization of bacteria, fungal, yeast, viral and bacteriophage cells. Nutritional classification of bacteria. Gram's staining. Bacterial culture - sampling, inoculation, culture media preparation, decimal dilution procedure, maintenance of pure culture, bacterial growth curve, bacterial growth measurement.

### Unit-II

Food poisoning, spoilage and food preservation, biogeochemical activity of microbes in nitrogen cycle and sulphur cycle, microbial biopesticides, microbes in fuel production, microbial production of antibiotics and vaccines

### Unit-III

Immunology-historical perspectives. Immunity types. Innate immunity – physical, physiological, cellular barriers. Acquired immunity-**characteristics-humoral and cell mediated immunity**. active and passive immunity.

### Unit-IV

Introduction to immune system. Cells and Organs. (primary and secondary lymphoid organs) Cells of the immune system: Cells of lymphoid lineage - lymphocytes, null cells; Cells of myeloid lineage - monocytes, macrophages, polymorphonuclear leucocytes, mast cells, antigen presenting cells, platelets. Antigens. **Characteristics, Types.**

### Unit-V

Immunoglobulin-**basic and ultra structure, types**, biological properties. **Antigen and antibody interactions**. Autoimmune disorders-**Immunodeficiency disorders-Transplantation immunology.**

**Text Book:**

Ananthanarayanan, R and Jayaram Paniker, C.K. 2000. Text Book of Microbiology, VI Ed., Orient Longman Ltd., Madras.

**Reference Books:**

Coleman, Lombard and Sicard. 1992. Fundamental Immunology, W.M.C.Brown Publishers.

Kuby, J. 1994. Immunology. W.H. Freeman and Co., New York.

Pelczer, M.J., Reid, R.D And Chan, E.C.S. 1996, Microbiology, V. Ed., Tata McGraw Hill Publishing Company Ltd., New Delhi.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	6	Sub Code	S5ZEL2B	Semester	V
Medium of Instruction: English/Tamil						Major Elective Course 2	

## ANIMAL BEHAVIOUR

(for students admitted from the academic year 2018-2019)

### Course objective:

The main objective of this course is to introduce the student about various behaviour of animals and its application in welfare of the animal community

### Course Outcomes:

After successful completion of this course, students should be capable of:

- ✓ Understanding and identifying the behaviors in a variety of taxa and the types of behaviour.
- ✓ Competently discuss the evolutionary origins of various behaviors.
- ✓ Designing and implementing experiments to test hypotheses relating to animal behavior.

### Unit-I

Introduction: The science of animal behavior-brief history. Diversity and unity in the study of behaviour and complex behaviour.

Development of behaviour: Accommodative and Associate learning. Hormones and early development. Genetic basis of behaviour. Neural control of behaviour.

### Unit-II

Stereotyped behaviour: Kinesis, taxis, orientation and reflexes. Motivation and conflict behaviour: decision making on different scales, drive, models of motivation, stress, territorial conflicts, threat display, displacement activities and fighting as conflict behaviour.

### Unit-III

Stimuli and communication: Diverse sensory capacities, sign stimuli, stimulus filtering. Communication. Ecological aspects of behaviour: Habitat selection, food selection, optimal foraging theory, anti-predator defenses. Aggression, homing, territoriality, dispersal. Host-parasite relations.

### Unit-IV

Courtship and ritual behaviour: Mate selection, male-male selection, female choice and maternal behaviour. Social organizations in insects and primates. Biological rhythms: Circadian and circannual rhythms.

### Unit-V

Hormones and behaviour: Pheromones and their biological actions in vertebrates and invertebrates. Chemical communication, body coloration, social life in insects (Termites and honey bees). Hormone in insect & crustacean metamorphosis.

### Text Books:

Aubrey Manning and Marian. S. Dawkins. 1995. An Introduction to Animal Behaviour. Cambridge University Press, 1995.

McFarland. D. The Oxford Companion to Animal Behaviour.

**Reference Books:**

McFarland.D. 1985. Animal Behaviour Psychology, Ethology and Evolution. Pitman Publications.

Slater.P.J.B. 1999. Essentials of Animal Behaviour. Cambridge University Press, 1999.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	2	Hours/Week	1	Sub Code	S5SB3G	Semester	V
Medium of Instruction: English/Tamil						SB 3	

## **POULTRY FARMING**

(for students admitted from the academic year 2018-2019)

### **Objectives:**

To impart training to our students, both on site and off site on the techniques of poultry and dairy farming. To create interest in the young minds to become entrepreneurs after graduation.

### **Course Outcomes:**

After successful completion of this course the student will

- ✓ Management of growers and layers by maintain the optimum rearing conditions (brood temperature, space, feed, water, debeaking and vaccination etc.)
- ✓ Able to express the basic idea of feed stuffs. proximate principles of feed.
- ✓ Understand the Important disease of poultry, such as (Ranikhets, fowlpox, avian leucosis, tick fever , tuberculosis , fowl cholera , infectious coryza)
- ✓ Recognize the Nutritive value of egg and meat and economic importance of poultry farming.

### **Unit-I**

Introduction to poultry science –poultry growth in India. Annual egg production in India. Nomenclature of breeds of fowl, - selection of breeds – Housing - equipment requirements for poultry sheds, deep litter system, laying cages.

### **Unit-II**

Brooding and rearing –brood temperature, space and duration; feed, water and space allowance, debeaking – vaccination. Management of growers, layers, broilers – lighting of chicks, growers and layers. Summer and winter management - Culling.

### **Unit-III**

Food stuffs for poultry in relation to protein, amino acids, minerals (Ca and P), vitamins and fibre content. Food Additives - Feed formulations for chicks, growers, Phase I to phase III layers and broilers.

### **Unit-IV**

Poultry diseases and their management: Ranikhet (New Castle) disease, Fowl pox, Avian Leucosis, Tick fever, Tuberculosis, Fowl Cholera, Avian leucosis, Infectious coryza .

### **Unit-V**

Nutritive values of eggs and meat: Quality, Preservation and Marketing of eggs, meat and poultry manure-Economics of Poultry farming. Problems in poultry production.

### **Reference Books:**

Sunil Kumar Das (1994) – Poultry production, CBC Publishers and Distributors, Delhi – 110032.

Banerjee G.C. (1992) A textbook of animal husbandary, Oxford and IBM Publishing Co., New Delhi.

### Question Pattern

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs



Credit	4	Hours/Week	-	Sub Code	S5ZEC	Semester	V
Medium of Instruction: English/Tamil						ECC1	

**BIOLOGY OF INSECTS**  
(for students admitted from the academic year 2018-2019)

**Objectives:**

This course aims to introduce students to basic insect biology, evolution, and comparative taxonomy. Insects impact society through their role as pests of agricultural, medical, and urban sectors as well as their beneficial roles in ecosystems and as biological control for invasive pests.

**Course Outcome:**

On completion of biology of insect, students should be able to

- ✓ define the key concepts relating to insect biology and evolution.
- ✓ classify and identify insects to the level of Order.
- ✓ have knowledge of insect morphology, biology, behavior, and ecology
- ✓ appreciate the environmental importance of insects
- ✓ familiar with the health and economic impacts of insects on humans

**Unit I:**

Introduction: General Features of Insects Distribution and Success of Insects on the Earth. Insect Society - Group of social insects and their social life Social organization and social behaviour (w.r.t. any one example)

**Unit II:**

Insect Taxonomy- Basis of insect classification; Classification of insects up to orders -General Morphology of Insects - External Features; Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits Thorax: Wings and wing articulation, Types of Legs adapted to diverse habitat Abdominal appendages and genitalia

**Unit III:**

Physiology of Insects - Structure and physiology of Insect body systems - Integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive, and nervous system Sensory receptors Growth and metamorphosis

**Unit IV:**

Insect Plant Interaction - Theory of co-evolution, role of allelochemicals in host plant mediation Host-plant selection by phytophagous insects, Insects as plant pests

**Unit V:**

Insects as Vectors - Insects as mechanical and Biological vectors, Brief discussion on houseflies and mosquitoes as important insect vectors

**Suggested readings**

A general text book of entomology, Imms , A. D., Chapman & Hall, UK

The Insects: Structure and function, Chapman, R. F., Cambridge University Press, UK Principles of Insect Morphology, Snodgrass, R. E., Cornell Univ. Press, USA  
Introduction to the study of insects, Borror, D. J., Triplehorn, C. A., and Johnson, N. F., M Saunders College Publication, USA

Credit	5	Hours/Week	6	Sub Code	S6Z6	Semester	VI
Medium of Instruction: English/Tamil						Core Course 11	

## DEVELOPMENTAL BIOLOGY

(for students admitted from the academic year 2018-2019)

### Objectives:

To understand the sequential changes from cellular grade organization to organ grade organization in the development of multi-cellular organisms.

### Course Outcomes:

- ✓ Students should understand the relationship between their experiments and concept covered in class.
- ✓ Students aware of the reproductive health.
- ✓ Be prepared to teach fundamental all developmental biology.
- ✓ Be prepared to learn the organogenesis.
- ✓ Students understand to techniques of cryopreservation and embryo of different species

### Unit-I

Definition and scope of embryology–Theories-pre-formation–Epigenesis–Van Baer’s law- Biogenetic law- Germplasm theory. Spermatogenesis and oogenesis in mammals- Types of eggs. Fertilization-mechanism and significance. Acrosomal reaction- Physiological and biochemical changes during fertilization.

### Unit-II

Cleavage, Planes and patterns of cleavage in frog and chick. Factors affecting cleavage. Morlulation, Blastulation, Gastrulation-frog and chick. Morphogenetic movements. Fate Map

### Unit-III

Organizer–Types of embryonic induction- Concepts of organizer–Spemann Experiment- Organogenesis- Development of eye, heart and kidney in frog and chick.

### Unit-IV

Extra Embryonic Membranes-Foetal membrane in chick.  
Placentation in mammals-Structure, Types,classification and functions. Hormonal control of implatation

### Unit-V

Hormonal control of amphibian metamorphosis. Regeneration-types and theories.  
*In vitro* fertilization and embryo transfer- Birth Control measures. Twin studies.

### Text Books:

Verma. P.S. and V.K. Agarwal. 2014. Chordate Embryology: Developmental Biology. S.Chand & Co, New Delhi.

Chattopadhyay, S. 2017. An introduction to developmental biology. Books and Allied Pvt. Ltd., Kolkata. Pp 630.

**Reference Books:**

Berril.N.J. 1986. Developmental biology, Tata Mc Graw Hill,New Delhi.

Balansky. B.J 1981. An introduction to Embryology. CBS College publishing, holt, rinchart and Winston.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	5	Hours/Week	6	Sub Code	S6Z7	Semester	VI
Medium of Instruction: English/Tamil						Core Course 12	

## **BIOSTATISTICS AND COMPUTER APPLICATIONS**

(for students admitted from the academic year 2018-2019)

### **Objectives:**

To study or introduce the basic concepts of statistics and its applications in biology. To give an overview of use of computers in biology with basic information about computer organization and functions

### **Course Outcomes:**

On completion of this course the students will:

- ✓ gain knowledge about data, types of data, data classification and tabulations with presentation of data
- ✓ Understand various tools & techniques used in biological systems and apply them in their research.
- ✓ gain knowledge about statistical methods like measures of central tendencies, hypothesis testing and inferential statistics
- ✓ have acquire knowledge on computers and basics of computer operation and its applications

### **Unit-I**

Data-**Definition**-Types of data-Primary and Secondary data-Method of data collection-Classification and Tabulation of data-Diagrammatic and Graphical representation of data

### **Unit-II**

Measures of Central Tendency – Mean – Median - Mode. Measures of Dispersion: Range - Standard Deviation - Standard Error - Variance

### **Unit-III**

Hypothesis Testing – **Levels of Significance**. Comparison of Means -Student's-T-test (paired means and two sample test) - Chi Square Test. Correlation and **Regression Analysis** (with simple problems).

### **Unit-IV**

Introduction to Computers-Generation-Types (Based on size and Functional)-Basic Components of Computer-Input and Out Devices

### **Unit-V**

Brief Introduction of Software (Operational and Application software). Application Software-MSWORD, EXCEL and POWER POINT- Internet, Web Site, Browser (Mozilla and Explorer), **Search Engines**-Email-Computer applications in Biology. Computer Viruses – Introduction

**Text Books**

Gurumani, N. 2005. An introduction to biostatistics. MJP Publishers. Chennai  
Ramakrishnan, P. 2010. Biostatistics. Saras Publications, Nagercoil.

**Reference Book**

Sokal, R. and Rohlf, F.J. 2009. Introduction to biostatistics. Dower Publications Inc. New York.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	6	Sub Code	S6ZP6	Semester	VI
Medium of Instruction: English/Tamil						Core Course 13	

**MAJOR PRACTICAL-VI  
DEVELOPMENTAL BIOLOGY, BIostatISTICS, COMPUTER APPLICATIONS  
AND BIOTECHNOLOGY-**

(for students admitted from the academic year 2018-2019)

**Course Outcomes:**

**Developmental Biology**

Temporary mounting of chick blastoderm.

Observation of mammalian spermatozoa (bull/Goat)

Examination of prepared microslides: Frog-egg, cleavage (2, 4, 8 cell stage).

Blastula, Gastrula, Yolk plug, tadpole

Chick embryo developmental stages-24, 48 and 72 hours

**Biostatistics**

Calculation of mean, median, mode

Standard Deviation, Standard Error, Correlation and Regression by using biological samples.

**Computer Applications**

Spotters: input and output devices

**Biotechnology**

Isolation of DNA (human buccal cells)

PAGE and AGE (demonstration)

A visit to Biotechnology Industry/Institute to have a working knowledge on modern biological techniques

Credit	4	Hours/Week	6	Sub Code	S6ZEL3A	Semester	VI
Medium of Instruction: English/Tamil						Major Elective 3	

## BASIC BIOTECHNOLOGY

(for students admitted from the academic year 2018-2019)

### Objectives

The course is to study the concept and scope of biotechnology, to understand–DNA Technology, to have awareness on the production of transgenic animals and the application of human genome project.

### Course Outcomes:

- ✓ To understand principles of biotechnology, gene cloning and ethical issues
- ✓ Familiarization of the terms associated with Animal tissue culture and understand to laboratory techniques of biomolecular and immunological techniques
- ✓ know applications in the different domains of enzyme biotechnology and biosensor.
- ✓ Briefing the specializations in the field of industrial biotechnology viz.,bioprocessing and single cell culture
- ✓ Learn about the role of environmental biotechnological applications

### Unit-I

Biotechnology: Scope and importance. Recombinant DNA and Gene Cloning. Cloning and expression vectors. Methods of gene transfer in Animals –Microinjection-Transfection-Embryonic stem cell transfer-retro virus mediated gene transfer- Transgenic Animals - ethical issues of biotechnology.

### Unit-II

Animal Cell Culture- types-media-establishment of cell culture laboratory.

Molecular Techniques: Polymerase Chain Reaction. Southern, Northern and Western Blotting Techniques- DNA finger printing- Immunotechnology-Monoclonal antibodies production– Applications of Biotechnology in medicine. Human Genome Project

### Unit-III

Enzyme Technology-Isolation and purification–Enzyme immobilization-Techniques and applications

Biosensors: Principle, Types and Applications.

### Unit-IV

Industrial Biotechnology: Fermentors-Design and types-upstream and downstream processing – Commercial production of single cell protein (SCP), Ethanol, Citric Acid, Acetic Acid, Vitamins and Antibiotics (Penicillin).

### Unit-V

Environmental Biotechnology: Biopesticides, Biofertilizers–Nitrogen fixation. Bioremediation–microbial biomining, Bioleaching



**Text Book:**

R.C.Dubey. 2006. A textbook of Biotechnology. S.Chand & Co, New Delhi. Pp 616.

**Reference Books:**

Sandy B. Prinrose. 1991. Molecular Biotechnology. ASM Press, Washington. Pp 280.

P.K. Gupta. 2005. Elements of Biotechnology, Rastogi Publication

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	6	Sub Code	S6ZEL3B	Semester	VI
Medium of Instruction: English/Tamil						MEC3	

## **ECONOMIC ENTOMOLOGY**

(for students admitted from the academic year 2018-2019)

### **Objectives:**

To enlighten the students on beneficial and harmful insects, their biology, their nature of damage and their management measures. To teach our students about pests which attack our crops and their management measures.

### **Course Outcomes:**

On successful completion of this course students will be able to:

- ✓ Identify the basic elements of insect pest in economically important crops, pests of stored products and their management.
- ✓ Outline the scientific method of pesticide classification, non-conventional and quarantine methods of insect pest management of crops.
- ✓ Apply the principles of integrated pest management for ecological balance by maintaining economic threshold levels.
- ✓ Familiarize beneficial insects, pollinators, soil builders, scavengers and bio-control agents in managing insect pests.
- ✓ Assess the insect vectors, mode of transmission and epidemiology with reference to human diseases.

### **Unit-I**

Insect Pests: Definition - Classification- Primary and Secondary pests – Major and Minor pests – Pests of Paddy, Sugarcane, Cotton– Their Biology, Nature of damage and management methods (Any four Major pests for each crop) - Pest outbreak - Pest resurgence - Pests of stored products and their Management methods.

### **Unit-II**

Principles of insect control: Prophylactic measures–An overview of cultural, mechanical, physical, biological and chemical methods. Pesticides–classification, types of pesticide formulation, mode of action, toxicity. Non-conventional methods of Insect Management– Insect Growth Regulators (IGRs), Repellents, Antifeedents, Pheromones, Chemosterilants, Irradiation, Quarantine methods– Botanical Pesticides and their use in management of insect pests of crops

### **Unit-III**

Integrated Pest Management (IPM): Definition and Integration of methods. Potential components of IPM and its application. Insect plant interactions. Pest – Predator Complex - Ecological balance – Economic Threshold Levels (ETLs)

### **Unit-IV**

Beneficial insects: Economic importance of honey bee; silk worm and lac insect - Pollinators, soil builders and scavengers. Biological control agents of Insect Pests – Pathogens, Parasites and Predators –Utilization of Bio-control agents in managing insect pests.

**Unit-V**

Insects and Diseases: Biology of insect vectors i.e., Housefly, Mosquito, Flea and Cockroaches. Mode of transmission pathogens and epidemiology of typhoid fever, dengue, plague.

**Text Books:**

David, B.V.2001. Elements of Economic Entomology. Popular Book Depot, Chennai.  
Fenemore, P.G. and Prakash, A. 2006. Applied Entomology. New Age International (P) Limited Publishers, New Delhi.

**Reference Books:**

Chapman, R. F. 1988. The Insects Structure and function. Cambridge University Press, U.K.  
Kumar, A. and Nigam, P.M. 2003. Economic and Applied Entomology. Emkay Publications, Delhi.

**Question Pattern**

Part A (10 x = 20)	Part B (5x5=25)	Part C (3x10=30)	Max Marks 75
Answer all the questions 2 question from each unit	Answer all the questions. Either or type- 2 question from each unit	Answer any 3 questions out of 5 questions, One question from each unit	Duration 3 hrs

Credit	4	Hours/Week	-	Sub Code	S6ZEC	Semester	VI
Medium of Instruction: English/Tamil						ECC2	

## **AQUARIUM FISHKEEPING**

(for students admitted from the academic year 2018-2019)

### **Objectives:**

the aim of this skill development course is to provides knowledge of ornamental fish farming, breeding and management which is highly professional and attractive avenue for youth

### **Course outcomes:**

On completion of this course student enables to set up a aquarium

- ✓ student enables to manage the home as well as commercial aquariums
- ✓ learn to handle different aquarium equipment and decorations of aquarium
- ✓ do breeding of Aquarium Fishes and have knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self-sustainable.

### **Unit 1:**

Introduction to Aquarium Fish Keeping The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

### **Unit 2:**

Biology of Aquarium Fishes Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish

### **Unit 3:**

Food and feeding of Aquarium fishes Use of live fish feed organisms. Preparation and composition of formulated fish feeds

### **Unit 4:**

Fish Transportation Live fish transport - Fish handling, packing and forwarding techniques.

### **Unit 5:**

Maintenance of Aquarium General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

### **Suggested Readings:**

David Alterdon. Encyclopedia of Aquarium and Pond Fish. 2019. DK Publishers.  
 Anathakrishnan: Bioresources Ecology 3rd Edition  
 Goldman : Limnology, 2nd Edition  
 Odum and Barrett : Fundamentals of Ecology, 5th Edition