

**B.Sc. ZOOLOGY  
SYLLABUS**

S.No.	SEM	SUB.CODE	PAPER	HOURS/ WEEK	CREDI T	EXAM HOURS	MARKS		
							INTERNA L	EXTERNA L	TOTA L
1	I	18ULT1	LC-I- Language	6	3	3	25	75	100
2	I	18ULE1	ELC-I- English	6	3	3	25	75	100
3	I	18UZO1	CC-I- Invertebrata	5	5	3	25	75	100
	I	18USBE1	SBE-1- Common paper	2*	-	-	-	-	-
4	I	18UES	EVS – Environmental Studies	2	2	3	25	75	100
5	II	18ULT2	LC- II - Language	6	3	3	25	75	100
6	II	18ULE2	ELC-II - English	6	3	3	25	75	100
7	II	18UZO2P	CP-I – Practical covering CC-I & CC-II)	3	4	3	40	60	100
8	II	18UZO3	CC-III-Chordata	6	5	3	25	75	100
9	II	18UBTA1	AC-I – Allied Botany	2	5	3	25	75	100
10	II	18UBTA2P	AP-I – Allied Botany Practicals	3	5	3	40	60	100
11	II	18UVE	VE – Value Education	2	2	3	25	75	100
12	II	18USBE1	SBE-I – Common Paper	2	4	3	25	75	100
13	III	18ULT3	LC-III - Language	6	3	3	25	75	100
14	III	18ULE3	ELC-III- English	6	3	3	25	75	100
15	III	18UZO4	CC-IV – Cell Biology	5	4	3	25	75	100
	III	18USBE2	SBE-II – Common Paper	2	4	-	-	-	-
16	III	18UZON1	NME-I – Aquaculture / Poultry Science	4	2	3	25	75	100
17	IV	18ULT4	LC-IV - Language	6	3	3	25	75	100
18	IV	18ULE4	ELC-IV - English	6	3	3	25	75	100
19	IV	18UZO5	CC-V - Ecology	5	4	3	25	75	100
20	IV	18UZO6P	CP- 2 – Practical II (Practical covering CC-III & CC-IV)	3	4	3	40	60	100
21	IV	18UCHA3	AC-III - Allied Chemistry	3	5	3	25	75	100
22	IV	18UCHA4P	AP-IV- Allied Chemistry Practical	3	5	3	40	60	100
23	IV	18USBE2	SBE-II - Common Paper	2	4	3	25	75	100
24	V	18UZO7	CC-VII – Bio physics, Bio Chemistry & Bio Statistics	4	4	3	25	75	100
25	V	18UZO8	CC-VIII – Developmental Biology	4	4	3	25	75	100
26	V	18UZO9	CC-IX- Genetics	5	4	3	25	75	100
27	V	18UZOE1	EC-I – Biotechnology/ Bio Instrumentation	5	5	3	25	75	100
28	V	18UZON2	NME-II – Public Health & Hygiene/ Apiculture and Sericulture (For Botany Students)	2	2	3	25	75	100
29	V	18USBE3	SBE-III – Common Paper	4	2	3	25	75	100
30	VI	18UZO10	CC-X – Animal Physiology	5	5	3	25	75	100
31	VI	18UZO11	CC-XI – Evolution	5	5	3	25	75	100
32	VI	18UZO12	CC-XII – Immunology	4	4	3	25	75	100
33	VI	18UZO13P	CP-3 – Practical – III ( Covering Paper – CC V, VI & VII)	3	4	3	40	60	100
34	VI	18UZO14P	CP- 4 Practical - IV (Covering Paper – CC VIII, IX & X)	3	4	3	40	60	100
35	VI	18UZOE2	EC-II- Microbiology/ Molecular Biology	5	5	3	25	75	100
36	VI	18UZOE3	EC-III - Vermiculture/ Ornamental Fish Culture	4	4	3	25	75	100
37	VI	18UGS	GS – Gender Studies	1	1	3	25	75	100
				<b>177</b>	<b>140</b>				<b>3700</b>

I  
**SEMESTER**

SEMESTER I CCI

INVERTEBRATA

HOURS/ WEEK – 5  
CREDIT- 5

**Objectives:**

To study the functional aspects of different systems and their significance of invertebrates in a comparative basis.

**UNIT- I PROTOZOA:**

General characters and classification upto order with examples.

**Detailed study:** Paramecium

**General topics:** Protozoan Parasite: - Plasmodium-life history-Pathology-control measures

**UNIT-II PORIFERA AND COELENTERATA:**

General characters and classification upto order with examples.

**Detailed study:** Obelia

**General topics:** Canal system in sponges and coral reefs

**UNIT- III PLATYHELMINTHES AND ASCHELMINTHES:**

General characters and classification upto order with examples.

**Detailed study:** *Fasciola hepatica*

**General topic;** Nematode parasites in man

**UNIT- IV ANNELIDA AND ARTHROPODA:**

General characters and classification up to order with examples

**Detailed study:** Neries

**General topic:** Adaptive Radiation in annelida

Larval forms of crustacean and their significance.

Connecting link between Annelida - Arthropoda

**UNIT-V MOLLUSCA AND ECHINODERMATA:**

General character and classification upto order with examples.

**Detailed study:** *Asterias rubens* (star fish)

**General topics:** Cephalopods as an advanced mollusc.  
Larval forms of Echinoderms

**TEXT BOOKS:**

1. Ayyar, C.K and T.N Ananthkrishnan 1992. A manual of Zoology Vol-I (Invertebrata).
2. Barrington, .J.W.1998. Invertebrates. Structure and function. MLBS publications
3. Hyman, I.H., 1986.The Invertebrates.Vol.I to VIII Mc Graw Hill publications Co.
4. Jordon, E.L., and P.S.Verma 1995. Invertebrate Zoology 12<sup>th</sup> edn. S.Chand&Co.
5. Kotpal, R.L. and S.K., Agarwal.1989. Modern text book of Zoology. Rostogi Publications.

**ALTERNATIVE SOFT SKILLS – SYLLABUS (3 COMMON PAPERS)**

**SOFT SKILLS – PAPER- I**

**OBJECTIVES:**

1. To inculcate Positive attitude and positive thinking among students.
2. To develop good communication and writing skills and command over English language.

**UNIT- I**

Positive attitude : Attitude – Features of attitudes- Formation of attitudes- Psychological factors change of attitudes – Ways of changing attitude in a person – the power of positive attitude –The benefits of positive attitude - Developing positive attitude – Obstacles in developing positive attitude- Negative attitude- The causes of negative attitude – The consequences of negative attitude – How to Change negative attitude.

**UNIT- II**

Goal setting – Introduction – importance of goal setting – goal definition- types of goals – What exactly goal setting- Why people don't set goals – How to choose the right goals- smart goals- Career goals- Benefits of career goal setting- Goal setting tips.

**UNIT- III**

Communication skills – Communication process- Types of communication- barriers to effective communication – Listening skills – Importance of tone of voice- Voice clarity – verbal expressiveness- Tips to develop communication skills – Government initiatives- Job roles.

**UNIT – IV**

Vocabulary enrichment – Definition and importance – Word formation : prefixes and suffixes – Compound Words – Compound nouns – Compound adjectives – synonyms and antonyms – Homonyms – Homophones – Idioms and phrases – One word substitutes – Confused words – Tips for vocabulary enrichment – Oral presentation : techniques and tasks – Self-introduction – Talking about objects – Description of person – Welcome speech – Vote of thanks.

**UNIT – V**

Resume Writing : Definition – Resume development – How does a resume work for you – Information that appears on most resumes – Resume writing tips – Online resumes – Guidelines for submitting resumes on the web – Computer friendly resume tips.

**Reference: Soft Skills and Industry Awareness – ICTACT Publications**

**E-source**

[https://www.bharathuniv.ac.in/colleges1/downloads/courseware\\_ece/notes/BSS201%20-%20PERSONALITY.pdf](https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf)

<https://vrsiddhartha.ac.in/ece/files/personality%20Development%20study%20material.pdf>

[http://164.100.133.129:81/econtent/Uploads/business\\_Corporate\\_Soft\\_SkillsS.pdf](http://164.100.133.129:81/econtent/Uploads/business_Corporate_Soft_SkillsS.pdf)

[rusa.nic.in/download/363/reports-and-publications/5326/skill\\_genie.pdf](http://rusa.nic.in/download/363/reports-and-publications/5326/skill_genie.pdf)

SEMESTER - I

HOURS/ WEEK - 2  
CREDIT - 2

## ENVIRONMENTAL STUDIES

### OBJECTIVES:

1. To create awareness among students about the importance of environment in which they live.
2. To make the students to know about the significance and the importance of biodiversity.
3. To make the students to realise their social responsibility and protect the nature.

### UNIT – I

**Definition and Nature of Environmental Studies :** Definition – Nature and scope – Importance of Environmental Studies – Need for Public Awareness Renewable and Non-renewable resources – Natural Resources and Associated Problems.

### UNIT – II

**Ecosystem:** Concept of Ecosystem – Structure and Function of an Ecosystem – Producers, Consumers and Decomposers – Energy flow in the Ecosystem- Ecological Succession – Food Chains- Food Web - Ecological Pyramid.

### UNIT –III

**Biodiversity and its Conservation:** Definition: Genetic, Species and Ecosystem Diversity – Biogeographical Classification of India – Value of Biodiversity: consumptive use, productive use, Social, ethical aesthetic and option values – Biodiversity at Global, National and Local levels – India as a Mega- Diversity Nation – Hot-spots of Biodiversity – Threats to Biodiversity : habitat loss, poaching of wildlife, man wildlife conflicts – Endangered and endemic species of India – Conservation of Biodiversity : In-situ and Ex-situ conservation of Biodiversity.

### UNIT – IV

**Environmental Pollution:** Definition – Causes, Effects and Control measure of Air pollution – water pollution – Soil pollution- Marine pollution – Noise pollution- thermal pollution- Nuclear pollution – Solid Waste Management- Causes – Effects and Control measure of urban and Industrial wastes – role of individual prevention of pollution.

### UNIT- V

**Social issues and Human population in relation to Environment:** Urban problems and related to Energy – Climate change – global warming – Acid rain- ocean layer depletion – population growth, variation among nations- population explosion- Family welfare programmes – Environment and human Health- Human rights – value education – HIV/AIDS –Women and Child welfare- Role of Information technology in Environment and Human Health.



**REFERENCES:**

- |                            |  |
|----------------------------|--|
| 1. Environmental Economics | - S.Sankaran                             |
| 2. Environmental Economics | - M.Karpagam                             |
| 3. Environmental Economics | - S.Varatharajan                         |
| 4. Environmental Economics | - D.W.Pearce                             |
| 5. Environmental Studies   | - Dr.C.Sethuraman – NCBH(P) Ltd- Chennai |

**II**  
**SEMESTER**

**SEMESTER - II**

**HOURS/ WEEK – 6  
CREDIT - 5**

## **CHORDATA**

Objectives:

To study the functional aspects of different systems and their significance of vertebrates in a comparative basis.

### **UNIT-I**

General characters and outline classification of chordates – Detailed study of Balanoglossus – Retrogressive metamorphosis of Ascidia-Feeding mechanism of Amphioxus

### **UNIT-II**

General characters of Pisces and its classification – Detailed study of Shark – (Excluding Endoskeleton). Respiratory organs in fishes.

### **UNIT-III**

General characters and its classification of Amphibia and Reptilia (Excluding Endoskeleton) – Detailed study: Frog – Parental care of Amphibia- Identification of poisonous and non poisonous snakes in India.

### **UNIT-IV**

General characters and classification of Aves – Detailed study of pigeon (Excluding Endoskeleton) Flight adaptations in birds –Flightless bird's characters and their distribution.

### **UNIT-V**

General characters and its classification of mammals –Detailed study of Rabbit (Excluding Endoskeleton) -Salient features of Aquatic mammals - Dentition in mammals

### **TEXT BOOKS:**

1. M.Ekambaranatha Ayyar (1993) – Out lines of Zoology - Vol- I. S.Viswanathan. Pvt. Ltd, Chennai.
2. Jordon, E.L. and Verma P.S (2003) – Invertebrate Zoology. S. Chand & Co.
3. H.D.Kumar (2000) – Biodiversity- Principles and conservation, Agrobios (India).
4. Sharma P.D (2001) – Ecology and Environment, Rostogi publications.
5. Gagdil M. (1996) – Biodiversity. Vol – 2. Indian academy of science,Bangalore.12.

SEMESTER - I I

HOURS/ WEEK – 4  
CREDIT - 5

## ALLIED ZOOLOGY

### ANIMAL DIVERSITY AND ECONOMIC ZOOLOGY

#### Objectives:

Animal diversity which is an essential topic for biologists to know the distribution, taxonomy and phylogeny of animal. To enlighten the primitive forms of invertebrates and vertebrates distribution. To help our students to understand the status and mode of living of different forms of animals. To give awareness to our students in various cultural aspects of zoology which will help them to design their future.

#### UNIT-I

**INVERTEBRATA:** Outline Classification & General characters of Protozoa and Colenterata

**Type study** : Obelia

**General topics** : Parasitic Protozoans – *Plasmodium vivax*, *Trypanosoma gambiense*

#### UNIT-II

General characters of Platyhelminthes and Annelida

**Type study** : Earthworm

**General topics** : Parasitic adaptation in *Fasciola hepatica* (liver fluke) and *Tanea soium* (Tape worm)

#### UNIT-III

General characters of Arthropoda and Echinodermata

**Type study** : Cockroach

**General topics** : Economic importance of Crustacians.

#### UNIT-IV

Vertebrata Outline Classification and general characters of reptiles, birds and mammals

**Type study** : Frog

**General topics** : Migration in birds- Identification of poisonous and non poisonous snakes.

#### UNIT-V

**Economic Zoology;** Apiculture (Artificial Bee hive construction and Honey extraction) Aquaculture (Indian major carps) and Ornamental fish culture (gold fish, black molly and guppies, vaga bond butterfly fish). Sericulture (Sericulture status of India, Uses of silk & by products of silk industry).

**TEXT BOOKS:**

1. Ayyar, C.K.and T.N.Ananthkrishnan1992. A manual of zoology Vol- I (Invertebrata).
2. Jordan, E.L. and P.S. Verma.1995. Chordate Zoology and Elements of animal physiology. S.Chand & Co
3. David B.V and T.J Kumaraswami. 1998. Elements of Economic entomology.Popular Book Depot.
4. Ganga and Sulochana chetty 2010 – An Introduction to Sericulture .Oxford and IBH publishing Co

**SEMESTER - I I**

**HOURS/ WEEK – 3  
CREDIT- 5**

**ALLIED ZOOLOGY PRACTICAL**

**INVERTEBRATA:**

**VIRTUAL DISSECTION**

**Cockroach** : Nervous Systems & Digestive System

**Earthworm** : Nervous Systems & Digestive System

**MOUNTING**

**Cockroach** : Mouth parts

**Earthworm** : Body setae

**SPOTTERS AND SLIDES**

**Protozoa**

- Paramecium Entire and Paramecium conjugation

**Conjunction**

- Trypanosoma and Entamoeba

**Porifera**

- Sycon, Gemmule and Spicules

**Coelenterate**

- Hydra, Physalia, Obelia medusa and Sea anemone

**Platyhelminthes**

- Liverfluke, Ascaris (Male & Female) Tapeworm Entire, Scolex proglottids and Redia Larva

**Annelida:**

Nereis Entire, Parapodium, Heteronereis, Trochophore larva, Chaetopterus and Leech

**Arthropoda**

- Penaeus, Peripatus, Limulus, Hermit Crab and Sea anemone

**Mollusca**

- Pilla, Unio, Chiton and Sepia

**Echinodermata**

- Starfish, Bipinnaria Larva and Sea Urchin

**CHORDATA:**

**Prochordata:**

- Amphioxus and Ascidian

**Fishes**

- Shark, Echinus, Exocoetus and Hippocampus

**Amphibia**

- Bufo, Hyla, and Ichthyophis

**Reptilia**

- Naja Naja, Viper, Draco and Chamaeleon

**Aves**

- Pigeon, Different types of Feathers

**Mammalia**

- Rabbit and Bat

**Dentition**

- Rabbit and Man

**TEXT BOOKS:**

1. P.S.Verma: Advanced Practical in Zoology (S.Chand & Co).
2. K.Vijaraman and K.Palanivel: Cheymurai vilangial: A complete Book (Chimeera)

**SEMESTER - II**

**HOURS/ WEEK – 2  
CREDIT - 2**

**VALUE EDUCATION**  
**[ALL UG COURESES]**

**Sub Code: 18UVE**

**OBJECTIVES:**

1. To familiarize the students with value concepts.
2. To make the students aware of different types of values.

**UNIT – I: CONCEPT OF VALUES**

Meaning of Value Education – Need and purpose of Value Education – Significance of Value Education in present context – Types of Values through various genres of literature.

**UNIT - II: FAMILY VALUES**

Components, Structure and Responsibilities of Family – Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

**UNIT – III: ETHICAL VALUES**

Professional Ethics – Mass Media Ethics – Advertising Ethics – Influence of Ethics on Family Life – Psychology of Children and Youth – Leadership qualities – Personality Development.

**UNIT – IV: SOCIAL VALUES**

Faith, Service and Secularism – Social sense and Commitment – Students and politics – Social Awareness, Consumer Awareness, Consumer Rights and responsibilities – Redressal Mechanisms.

**UNIT – V: SPIRITUAL VALUES**

What is Religion? – Role of Religion – Misinterpretation of Religion Relationship between Spiritual and religion – Moral Policing – Consequences – Religion sa Spritual Quest – Aesthetics and Religion.



**Reference Books:**

T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)

Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002 DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.

Daniel and selvamony – Value Education Today, ( Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)

S. Ignacimuthu – Value for life – Better Yourself Books, Mumbai, 1991.

M.M.M. Mascaronhas centre for Research Education Science and Training for Family Life Promotion – Family Life Education, Bangalore, 1993.

Dr. C. Sethuraman – NCBH (p) Ltd. Value education – Chennai.

**WEBSITES AND e-LEARNING SOURCES**

[www.rkmissiondhe.org/education.html/](http://www.rkmissiondhe.org/education.html/)

[www.clallam.org/lifestyle/education.html/](http://www.clallam.org/lifestyle/education.html/)

[www.sun.com/./edu/progrmws/star.html/](http://www.sun.com/./edu/progrmws/star.html/)

[www.infoscouts.com](http://www.infoscouts.com)

[www.secretofsuccess.com](http://www.secretofsuccess.com)

[www.1millionpapers.com](http://www.1millionpapers.com)

[://militaryfinance.umuc.edu/education/edu-network.html/](http://militaryfinance.umuc.edu/education/edu-network.html/)

SEMESTER – I & II

HOURS/ WEEK – 3  
CREDIT- 4

**INVERTEBRATA & CHORDATA**

**MAJOR PRACTICAL -1**

**INVERTEBRATA:**

**VIRTUAL DISSECTION:**

<b>Cockroach</b>	:	Nervous & Digestive System
<b>Earthworm</b>	:	Nervous & Digestive System
<b>Frog</b>	:	Digestive and Circulative system (CAD)

**MOUNTING**

<b>Earthworm</b>	:	Body setae, Pineal setae
<b>Cockroach</b>	:	Mouth parts

**SPOTTERS AND SLIDES**

**Protozoa**

- Paramecium Entire and conjugation
- Trypanosoma and Entamoeba

**Porifera**

- Sycon, Gemmule and Spicules

**Coelenterata**

- Hydra, Physalia, Obelia medusa and Sea anemone

**Platyhelminthes**

- Liverfluke, Ascaris (Male & Female) Tapeworm Entire, Scolex proglottids, and Redia Larva

**Annelida**

- Nereis Entire, Parapodium, Heteronereis, Trochophore larva, Chaetopterus and Leech

**Arthropoda**

- Penaeus, Peripatus, Limulus and Hermit Crab

**Mollusca**

- Pila, Unio, Chiton and Sepia

**Echinodermata**

- Starfish, Bipinnaria Larva and Sea Urchin

**CHORDATA:**

**Prochordata:**

- Amphioxus and Ascidian

**Fishes**

- Shark, Echinus, Exocoetus and Hippocampus

**Amphibia**

- Bufo, Hyla and Ichthyophis

**Reptilia**

- Naja Naja, Viper, Draco and Chamaeleon

**Aves**

- Pigeon, Types of Feathers

**Mammalia**

- Rabbit and Bat

**Dentition**

Rabbit and Human

**TEXT BOOKS:**

1. P.S.Verma: Advanced Practical in Zoology (S.Chand & Co).
2. S.S.Lal: Parctical Zoology: Chordates (Rastogi Publications).
3. K.Vijaraman and K.Palanivel: Cheymura vilangial: A complete Book (Chimera Trichy)

**III**  
***SEMESTER***

**SEMESTER - III**

**HOURS/ WEEK – 5  
CREDIT- 4**

## **CELL BIOLOGY**

### **Objectives:**

This course facilitates to understand the structure at molecular level and function of prokaryote and eukaryote cell. To enlighten our students about the structures and functions of cellular organelles and types of cell division.

### **UNIT-I**

Types of cell – Prokaryotic and Eukaryotic: Ultra structure of prokaryotic and Eukaryotic cells Compound and Electron microscope, cytological techniques – fixation and staining.

### **UNIT – II**

Plasma membrane – Ultra Structure and function, Chemical composition. Endoplasmic reticulum – Ultra Structure and functions and Golgi complex – structure and functions.

### **UNIIT - III**

Lysosome - Structure and functions, Mitochondria- Structure and functions, Ribosomes - Types, Ultra structure, Chemical composition and functions.

### **UNIT –IV**

Ultra Structure and functions of Nucleus and Nucleolus, Chromosome – Structure and functions, Giant Chromosomes. Polytene chromosomes and Lamp brush chromosomes.

### **UNIT – V**

Molecular events during cell cycle - Cell Division -Mitosis and Meiosis – Types of cancer, Difference between normal and cancerous cell.

### **TEXT BOOKS:**

1. Verma, P.S, and Agarwal, V.K. (1998) Concept of Cell Biology, S.Chand & Co Ltd., New Delhi.
2. Power, C.B., 1989 Essentials of Cytology, Himalaya Publishing House.
3. M.L. Gupta and M.L.Jangir, (2011). Cell Biology, Fundamental and applications Agrobios publishers (P) Ltd.
4. Cell and Molecular biology – N.Arunpandi Student publications New Delhi 1

## **SOFT SKILLS – PAPER II**

### **Objectives:**

1. To develop leadership for qualities in students.
2. To prepare the students Interviews group discussion, debate and to make them to gain confidence and become more compatible and successful.

### **UNIT- I**

Letters – Formal- informal – Business- Letters to the Editor.

### **UNIT- II**

Group Discussion- Types of GD- Discussion Vs debate- Personality traits – Advantages of GD – Dos and Don'ts.

### **UNIT – III**

Selection Interview – Introduction – Interview – meaning – Interview structure – Interview panel –Types of Interview – Questions looked for in Interview – preparation before interview – Body language – Dos and Don'ts – Standard interview question- your answer to questions.

### **UNIT – IV**

Time management – Importance of time – Importance of time management – the pareto 80:20 principles and Time management – The time management matrix – its Utilization – Procrastination : causes and effects – How to overcome procrastination – effective time management – Tools for effective time management.

### **UNIT –V**

Leadership –Need for leadership – Definition of Leadership –Essence of leadership – Functions of effective leaders- Differences between leadership and management –Positive and Negative leaders- Differents leadership styles – David McClelland's classification of leadership –choice of correct leadership style- emerging perspective on leadership in organizations.

**REFERENCES:** Soft Skills and Industry Awareness –ICTACT Publication.

E-Source

[https://www.bharathuniv.ac.in/colleges/downloads/courseware\\_ECE/NOTES/BS%201%20-%20PERSONALITY.Pdf](https://www.bharathuniv.ac.in/colleges/downloads/courseware_ECE/NOTES/BS%201%20-%20PERSONALITY.Pdf).

<http://vrsiddhartha.ac.in/ece/files/personality%20development%20study%20material.pdf>.

**SEMESTER – III**

**AQUACULTURE**

**Objectives:**

The main aim is to give information about the culture of fishes and prawns. It gives an idea for the self-employment opportunities to the students. The role of different research organizations and funding agencies to promote aquaculture.

**UNIT – I**

Definition and scope of Aquaculture – importance of Aquaculture – Present status of Aquaculture in India – Aquaculture and fishery institutions of India(CMFRI, CIFA, CIBA, MPEDA and FSI).

**UNIT - II**

Water Quality Management. Different types of Aquaculture – Monoculture, Polyculture, Integrated farming - Pond culture – Cage Culture – Pen Culture and Raft Culture – Sewage fed fish Culture- Cultivable fresh water fishes (Catla, Rohu and Mirgal)

**UNIT – III**

Design and construction of Culture Ponds – PreStocking Management – Food and feeding- live and Supplementary feed and its characteristic features.

**UNIT – IV**

Culture of Pearl Oyster(*Pinctada fucata*), Edible oyster(*Crassostrea madrasensis*) and Sea weed culture (*Sargassum wightii* (brown algae), *Kappaphycus alvarezii*(Red algae) -Prawn & Shrimp culture(*Penaeus monodon*,*Litopenaeus vannamei*)-Ornamental fishes.(Black molly,Guppies ,Gold fish,Angel fish,Sword fish)

**UNIT- V**

Raft and Gears. Fish preservation, marketing-Fish diseases and its control : fungal diseases(Saprolegniasis,Branchiomycosis) bacterial diseases( fin and tail rot disease, cotton mouth disease)and viral diseases(Lymphocystis, chinook disease, Infectious pancreatic Necrosis).

**REFERENCES:**

1. Bardach, J.H., J.H.Ryther and W.O. McLarrey. 1972. Aquaculture: The farming and husbandry of freshwater and marine organisms. Wiley interscience. publications
2. Pillai, T.V.R.1988, Aquaculture: Principles and practices. S.Chand & co
3. Ramasamy, P.1992. Diseases of Shrimps in Aquaculture systems. Vanitha Publications.



4. Vijayaraman, K. George John Sivkumar, P. and Rafi Mohamed, R. 1999. Nanneer Eral Valarppu-A Manual. Tamilnadu state Council for science and Technology.
6. Lagier Karl, F, 1986, Ichthyology, Wiley Interscience publications

**SEMESTER - IV**

**HOURS/ WEEK – 4  
CREDIT -4**

## **POULTRY SCIENCE**

### **Objectives:**

The main aim is to give information about the poultry and its importance. It gives an idea for the self- employment opportunities to the students. The role of different research organizations and funding agencies to promote poultry farming.

### **UNIT-I**

Introduction – progress of poultry industry in India. Types of poultry-plymouth rock, Minorca, Red and White leghorn

### **Unit-II**

Management – Practical aspects of chick rearing - Management of growers, layers and broilers – Lighting and temperature – Summer and Winter Management – debeaking

### **UNIT-III**

Poultry Nutrition – Requirement - food additives and Feed ingredients and formulation

### **UNIT-IV**

Diseases of poultry – viral, bacterial, fungal and parasitic diseases - symptoms and preventive measure.

### **UNIT-V**

Factors affecting egg size – grading – storage, preservation methods and marketing –Economics of poultry industry.

### **TEXT BOOKS:**

1. Biooster , S.1989, Diseases of poultry , Oxford and IBH
2. Felwal and Fox. 1992, proctical poultry feeding. ELBS Editing
3. Singh. J and E.N. More. 1982. Liver tock and Pouitry prodution. Prentice hall of india
4. Ganamani, K.1997. Modern aspects of poultry keeping. Hytone publishers, Madurai

**IV**  
***SEMESTER***

**SEMESTER - IV**

**HOURS/ WEEK - 5  
CREDIT - 4**

## **ECOLOGY**

### **Objectives:**

The main aim of this paper is to give information about the environment of biotic and abiotic factors, bio-geo chemical cycles, Habitat, population ecology, pollution and their control measures. The toxicant related with environment, the toxic effects in different fields and to find out the environmental pollutants.

### **UNIT-I**

Definition and scope of Ecology- Concept of Ecology: Factors influencing ecology: Abiotic (Light, Temperature, Soil and Rainfall) and biotic Factors.

### **UNIT-II**

Biogeochemical cycle: Carbon cycle, Nitrogen cycle, Oxygen cycle, Phosphorous and Sulphur cycle.

### **UNIT-III**

Ecosystem : Definition – Aquatic ecosystem – Pond, Terrestrial - Grassland – Primary and secondary production, Food chain – Food web, Trophic level, Energy flow – Ecological pyramids.

### **UNIT – IV**

Population : Characterization of population Ecology.

Community : Ecological niche – Ecological succession.

Habitat: Marine, Sandy and Muddy shore adaptations.

### **UNIT – V**

Water, Land, Air, Noise and Radioactive pollution detailed and preventive measures.

Green house gases, Global warming and its control measures.

Wild life sanctuaries and National parks in India.

### **TEXT BOOKS:**

1. Rastogi V. B and M.S jayaraj 1989. Animal ecology and distribution of animal, Kedamath Ramnath
2. Odaum, E.P. 1971 Fundamental of Ecology – W.B sunders company, philadelphia
3. Verma. P.S. and V.K. Agarwal 1996. Principals of Ecology S.Chand & Co New Delhi.
4. Sharma, P.D. 1990 Ecology and Environment, Rostogi publications Meerut.

**SEMESTER - I V**

**HOURS/ WEEK - 3  
CREDIT - 4**

**MAJOR PRACTICAL -II**

**CELL BIOLOGY AND ECOLOGY**

**CELL BIOLOGY**

- i. Chironomous larva – Mounting of polytene chromosome
- ii. Onion root tip – Squash preparation to study different stages of mitosis
- iii. Spotters and Models  
Tissue – Epithelial, Muscular, Nervous, Micrometer, Camera Lucida.

**ENVIRONMENTAL BIOLOGY**

- i. Estimation of Dissolved oxygen.
- ii. Estimation of Salinity.
- iii. Estimation of Co<sub>2</sub>.
- iv. Estimation of Calcium.
- v. Identification and Mounting of Marine and Fresh water Planktons

**SPOTTERS AND MODELS**

Animal association: identification, interstitial fauna of Rocky, Sandy and Muddy shores with examples in each category)

pH meter, Thermometer, Lux Meter, Secchi disc, Barometer.

**TEXT BOOKS:**

1. E.D.P DeRobertes and M.F.DeRobertes : Cell and molecular Biology (W.B.Saunders)
2. A.L. Giese :Cell physiology (W.B.Saunders)
3. P.S. Verma and V.K. Agarwal ;Cytology (s.Chand & co)
4. Agarwal, A.K. Ecology and Environmental Biology, Student Edition, Agrobios (India).
5. K.Vijiayaraman and K.palanivel : Cheymurai Vilangial : A Complete book (Chimera)

**V**  
***SEMESTER***

**SEMESTER - V**

**HOURS/ WEEK – 4**  
**CREDIT - 4**

## **BIOPHYSICS, BIO CHEMISTRY AND BIO STATISTICS**

Objectives:

This paper gives information about the biochemical and biophysical aspects related to living organisms. The life supporting molecules, their metabolism, biological oxidation and its relevance. Biophysical aspects and their properties. Various statistical analysis of biological parameters.

### **UNIT –I -BIOPHYSICS**

Importance of biophysics: Colloids – Types, properties, Osmosis, Dialysis,-Beer Lamber's law of light absorption – Spectrophotometry and its application – Thin layer Chromatography.

### **UNIT-II BIOCHEMISTRY**

Structure of biomolecules: Protein (Primary Secondary, Tertiary and Quarternary structure) Carbohydrates and Lipids, Metabolism of Carbohydrate (Glycolysis and Krebs cycle) Protein (Deamination and Transamination) and Lipid (basic structure and beta acid of lipids).

### **UNIT-III**

Enzymes : Characteristics of enzymes, Mechanism of enzyme action. Vitamins: Type of vitamins – source, function, deficiency diseases and remedy. Hormones: Type of hormones and their functions (Reproductive and Growth hormones).

### **UNIT-IV BIOSTATISTICS**

Data collection – Raw data, primary and secondary data, processing of data classification and tabulation. Graphical Representation: Bar diagram, Pie diagram, frequency polygon, frequency curve, histogram, Measures of central tendency: Arithematic mean, median, mode, standard deviation and standard error.

### **UNIT –V DIAGRAMMATIC REPRESENTATION OF DATA**

Simple Correlation, simple regression, small sample test (t, chi-square, f-tests).

TEXT BOOKS:

1. Daniel, M., 1992 Basic Biologists' wiley International, newDelhi
2. Das. A., 1996. Biophysics and Biological chemistry. Academic publishers, Calcutta.
3. Robert Murray : Harper's Biochemistry (G. Lange Medical Book)
4. L. Stryer : Biochemistry (Wiley International)
5. Ramarkrishnan,P.1995 Biostatistics, saras publication, Nagarcoil
6. Gurumani N. 2005 an International to Biostatics Tamil Nadu Book House.



**SEMESTER - V**

**HOURS/ WEEK – 4  
CREDIT - 4**

## **DEVELOPMENTAL BIOLOGY**

### **Objectives:**

This course provides the process of early embryonic development and review the current development in the field of embryology. The formation of embryo and embryological disorders and treatment methodology. Precaution and health care during pregnancy and gestation.

### **UNIT – I**

Gametogenesis and Fertilization: definition – Gametogenesis in mammals- Theories of development: Structure of Mammalian sperm and ovum-Mechanism of fertilization-Role of acrosome in fertilization.

### **UNIT – II**

Cleavage, Fate Map and Gastrulation: Planes and Patterns of cleavage – fate map of frog – Gastrulation in frog – Morphogenetic movements of cells.

### **UNIT – III**

Organogenesis: Types of embryonic induction – theories of induction – Organizer concept. Organogenesis: Development of eye and Brain in frog.

### **UNIT – IV**

Metamorphosis and Regeneration: Hormonal control of metamorphosis in frog and insects, - general account of regeneration in animals (Reptilia, Planaria and star fish).

### **UNIT – V**

Extra Embryonic Membranes and Placenta: Embryonic (Foetal) membranes in chick – placentation in mammals: Types of Placenta- concept of test tube baby – Birth control – Nuclear transplantation – stem cell culture and its uses.

### **TEXT BOOKS:**

1. Verma P.S. and Agarwal V.K. (1996). Chordate embryology (Chand & Co), New Delhi.
2. Jain, P.C. (1994). Development Biology, vishal publications, Jalandhar
3. Balinsky, B.J.(1981) An Introduction to embryology, CBS College publishing, holt, Rinehart and winston.

**SEMESTER - V**

**HOURS/ WEEK – 5  
CREDIT - 4**

## **GENETICS**

### **Objectives:**

To understand the functional concepts of genetics, human related genetic problems, inborn errors and genetic counseling. To acquire knowledge on the applied branches of genetics.

### **UNIT-I**

Mendelism and Allelism: Mendelian laws of inheritance, Monohybrid and di hybrid cross, Interaction of genes – Supplementary, Epistasis, Incomplete dominance Multiple alleles: Blood groups and their inheritance (ABO &, Rh factor).

### **UNIT-II**

Mutation: Gene mutation, chromosomal aberrations – Euploidy – Aneuploidy – Extra chromosomal inheritance - Kappa particles in paramecium – Sex linked inheritance – Colour blindness.

### **UNIT – III**

Linkage Crossing Over and Sex Determination: Linkage types- Mechanism (Eg. Drosophilla) Crossing Over types- Mechanism (Eg. Drosophilla). Factors affecting crossing over. Sex determination: Barr body - Chromosomal, Environmental and Hormonal. (With examples) – Heterogametic sex.

### **UNIT – IV**

Molecular and Microbial Genetics: Gene concept, DNA as a genetic material – Genetic code. Recombination in bacteria – conjugation – Transformation – Transduction.

### **UNIT – V**

Human Genetics: Human Chromosome structure, Karyo type – Pedigree analysis. Syndrome: (Kline felter – Turner – Down) Inborn errors of metabolism: (phenyl ketoneuria, Alkaptonuria) Mendelian Traits in man - Genetic counseling. Eugenics – Euthenics.

### **TEXT BOOKS:**

1. Goodenough, U., 1997, Genetics, Saunders college publishing international New York
2. P.S Verma and V.K. agarwal: Genetics(Chand & Co)
3. D.Friedlander: microbial genetics(Narosa publishing)
4. J.D. Haukins: Gene structure and function (Cambridge university press)

**SEMESTER - V**

**HOURS/ WEEK – 5  
CREDIT- 5**

## **BIOTECHNOLOGY**

### **Objectives:**

This paper deals with the applied aspects of biotechnology in medical, agricultural, industrial, microbial and environmental fields. The uses of the recombinant techniques and its application for the betterment of mankind.

### **UNIT – I**

Introduction to Genetic Engineering: Scope and significance of biotechnology - Gene cloning vectors- mechanism of gene cloning in eukaryotes using *Agrobacterium*- Transgenic animals and plants- Human genome project.

### **UNIT – II**

Molecular techniques: Southern, Northern and Western blotting- Construction of Gene library and cDNA library – Polymerase Chain Reaction- Hybridoma technology and monoclonal antibodies- applications of biotechnology in medicine.

### **UNIT –III**

Enzyme technology: Isolation and purification of enzymes- immobilization of enzymes- application of Enzyme in different fields.

### **UNIT-IV**

Industrial Bio Technology: Basic structure and types of fermentor –Types of fermentation. Ethanol and vinegar production using fermentation technology – application of biotechnology in Pharmaceutical industry.

### **UNIT-V**

Agricultural BioTechnology: Biofertilizer and its uses, Transgenic plants- disease resistant, stress resistant (salt and drought) Single cell protein (spirulina) and its uses.

### **TEXT BOOKS:**

1. R.Primrose: Molecular Biotechnology (ASM press, Washington)
2. B.R Glick and J.J Pasterenack; Molecular Biotechnology (ASM press, Washington)
3. S. Damond and T.Nicholl; Generic engineering (Cambridge university press)
4. P.K. Gupta; Elements of Biotechnology (Ratsyogi publication)
5. Vijayaraman, K.S.Chellammal and P.Manikilli.1998.Uyirithozhilnutpam, Chimera.
6. Biotechnology - S.S.Purohit (2010) Agrobios publishers (P) Ltd.,Jodhpur.

**SEMESTER - V**

**HOURS/ WEEK – 5  
CREDIT 5**

## **BIO INSTRUMENTATION**

### **Objectives:**

The main aim of this paper is to provide the principle and the working knowledge of various instruments used in the laboratory to the students.

### **UNIT I**

Microscopy – Principle and application – Light microscope, electron microscope – TEM, SEM, Atomic absorption microscope. Steps involved in sectioning, staining and counting. Cytophotometry, cryostat.

### **UNIT II**

pH meter, Colorimeter. Principle and application - Spectroscopy - UV- Visible, Atomic Absorption Spectroscopy. Principles of electrochemical techniques.

### **UNIT III**

Chromatography: Principle, instrumentation and applications of - Paper, thin layer chromatography and Column chromatography Gas liquid chromatography. Electrophoresis- AGE and PAGE.

### **UNIT IV**

DNA Sequencing techniques types, Biosensors and Biochips – Principle and applications. Hybridoma technology – Applications of monoclonal antibodies.

### **UNIT V**

Laboratory administration, Management and safety, Safe disposal of laboratory wastes. Cleaning care and sterilization of laboratory items – dry and wet (flame, steam, and chemical sterilization).

### **TEXT BOOKS:**

1. Daniel, M., 1992, Basic Biology, Wiley International, NewDelhi.
2. Das. A., 1996. Biophysics and Biological chemistry. Academic publishers, Calcutta.
3. P.K. Gupta; Elements of Biotechnology (Ratsyogi publication), New Delhi.
4. P.S. Verma and V.K. Agarwal; Cytology, S.Chand & Co, New Delhi.

SEMESTER -V

HOURS/ WEEK – 2  
CREDIT- 2

## PUBLIC HEALTH AND HYGIENE

### Objectives:

To give the students awareness about public health aspects and the importance and necessity of hygiene practices. For healthy life.

### UNIT – I

Scope of Health and hygiene – History of public health in India – Nutrition and health: classification of foods. Growth and development – growth chart, nutritional deficiency diseases- nutritional requirements for special groups – Balanced diet.

### UNIT- II

#### **Environment and Health Management**

**Water:** water standards and purification of water

**Air:** Ventilation, discomfort prevention of pollution

**Soild Waste:** Excreta disposal methods

**Noise pollution:** Effects and prevention

### UNIT – III

**Communicable Disease:** Small pox, Measles, Mumps, Diphtheria, influenza, Tuberculosis

**Intestinal infections:** Cholera, Typhoid, Amoebiasis

**Arthropod Borne infection:** Malaria, Filariasis, Dengue

**Zoonosis:** Rabies, Encephalitis and plague

### UNIT – IV

Non communicable Diseases: Coronary heart diseases, stroke, hypertension, diabetes mellitus, obesity, blindness

### UNIT –V

**Occupational Health:** Physical, Biological, Mechanical, social and Psychological hazards

**Mental Health:** Alcohol and drug abuses

**Health Education:** Health plans of India – role of National and international organization (WHO) in the Health care of the community.

### References:

Bauman, R.2007. Microbiology with diseases by Taxonomy. Benjamin Cummings.  
Park, K.2002. Park's Text Book of preventive and social Medicine. 17<sup>th</sup> Edition., M/s. Banaaridas Bhanot publishers.

**SEMESTER - V**

**HOURS/ WEEK – 4  
CREDIT - 4**

## **APICULTURE AND SERICULTURE**

### **Objectives:**

The main aim is to provide information about the culture of silkworm and honey bees. It gives an idea for the self-employment opportunities to the students and idea about the role of different research organizations and funding agencies to promote sericulture and apiculture.

### **UNIT – I**

Honey Bee: Definition and Scope of Apiculture, Systematic position – Species of honey bees – life history of honey bee.

### **UNIT – II**

Food of the honey bee, Honey and Pollen artificial feeding behavior of bees – dances Bee colony, castes – Natural colonies and their yield – Types of beehives – structure – location, care and management – breeding of stocks –winterbroods.

### **UNIT – III**

Extraction of honey and Storage of honey Chemical composition, Nutritive and medicinal values. Bee hives and other products – bee enemies – Present status of Apiculture in India.

### **UNIT – IV**

Sericulture: Introduction, types, importance and its role in economic development, status of sericulture industry in India. Culture and harvesting of mulberry – Diseases of mulberry and preventive measures.

### **UNIT – V**

Silkworm: Life history of *Bombyx mori* – Rearing techniques of silkworm- diseases of silk worm – silk reeling (cooking, reeling, staining, twisting and weaving) - Economic importance of silk in india.

### **TEXT BOOKS:**

1. Cherina, R. and K.Ramanathan 1992 Bee keeping in India.
2. Mishra, R.c., 1985, Honey bees and their management in India ICAR.
3. FAO, 1992, Sericulture Manual – 2 (Silkworm rearing). Oxford & IBH.
4. FAO, 1994. Sericulture Manual – 2 (Silk reeling). Oxford & IBH.

### **SOFT SKILLS – PAPER III**

#### **OBJECTIVES:**

1. To develop the knowledge of computer handling to make them to learn basic principal of commerce and economics.
2. To train Tue students job oriented and become self dependent.

#### **Unit – I:**

Knowing computer – Characteristics of a computer – Limitations of a computer – Components of hardware – basis of operating systems – Definition – Functions of operating systems – categories of operating systems – Windows features – Start up, Shut down - Opening and closing an application – manipulating windows – saving – printing – deleting files – start menu.

#### **Unit – II:**

Retail sector – Introduction – Market size – Investment scenario – Advantage India – Government Initiatives – Types of stores – Types of Merchandising – Store operations – Store appearance – Store security – Make it difficult for retail theft to happen – Inventory and stock management – Store organization – Importance of store organization.

#### **Unit – III:**

BFSI sector – Banking sector – Market size – Investments – What is banking? – Types of banks – Functions of bank – Types of bank accounts – e-banking (electronic banking) – Government initiatives – financial services – market size – investments- government initiatives.

#### **Unit – IV:**

Insurance sector – Market size – investments – advantage India – policy measures – opportunities – government initiatives – advantages and uniqueness of India's Life Insurance sector – Job roles – ITES Sector – introduction – IT services sector – BPO services sector - market size – investments – skill requirements in the IT and ITES industry – major trends impacting skill requirements.

## Unit – V:

Business process Outsourcing (BPO) – advantages of BPO – disadvantages of BPO – classification of BPO hospitality sector : introduction – tourism – Indian market – market size – investments – government initiatives –types of tourism – opportunities – benefits of career – road ahead – theme parks – facts on Indian amusement park industry – structure and developments of amusement park sector- tourism- amusement parks- recreation industry- amuesment parks- – hotel industry – categorization of hotels – latest developments – cruise lines – India’s cruise potential – time for domestic cruising – cruise line in India Job Roles.

### Reference: Soft Skills and Industry Awareness – ICTACT Publications

#### E-source

[https://www.bharathuniv.ac.in/colleges1/downloads/courseware\\_ece/notes/BSS201%20-%20PERSONALITY.pdf](https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf)

<https://vrsiddhartha.ac.in/ece/files/personality%20Development%20study%20material.pdf>

[http://164.100.133.129:81/econtent/Uploads/business\\_Corporate\\_Soft\\_SkillsS.pdf](http://164.100.133.129:81/econtent/Uploads/business_Corporate_Soft_SkillsS.pdf)  
[http://www.rusa.nic.in/download/363/reports-and-publications/5326/skill\\_genie.pdf](http://www.rusa.nic.in/download/363/reports-and-publications/5326/skill_genie.pdf)



**VI**  
***SEMESTER***

SEMESTER - VI

HOURS/ WEEK – 5  
CREDIT- 5

## ANIMAL PHYSIOLOGY

### Objectives:

Animal Physiology helps the students in understanding how the body functions adapts with respect to its external and internal environment, related to nervous integration, sensation, metabolism and reproduction.

### UNIT – I

**Nutrition:** Types of Nutrition, Malnutrition, Deficiency, Problem, Solution. **Respiration:** Respiratory organ- Mechanism of respiration in man- Transport of respiratory gases. **Circulation:** Structure of human heart, Cardiac rhythm, Cardiac cycle- ECG.

### UNIT – II

Digestive systems – Structure, digestive glands, digestion of food - digestion and absorption of carbohydrates, lipids and proteins.

### UNIT III

**Excretion:** Structure of Kidney–Ultra structure of Nephron, Mechanism of urine formation in man, Kinds of excretory products **Osmoregulation:** Mechanism of Osmo regulation in fresh water and marine water fishes. **Muscle:** Type of muscles - Ultra structure and physiology of contraction and relaxations of muscles.

### UNIT- IV

**Nerve:** Neuron – and its types, mechanism of conduction of nerve impulse – synaptic transmission- Reflex action. **Receptors:** Phono, chemo and photo receptors (structure and function).

### UNIT – V

**Endocrine glands:** Types and importance, Structure and function of pituitary, Thyroid, parathyroid, pancreas, Adrenal, Testes and Ovary – Role of hormones in estrous cycle, menstrual cycle, pregnancy, lactation and menopause.

### TEXT BOOKS:

1. Rastogi, S.C., 2001 Essential of animal physiology. Third Edition, New Age international publication, New Delhi
2. Verma, Tyagi and Agarwal 2000 Animal physiology S.Chand and company Ltd., New Delhi
3. Text Book of Human Physiology (2010)- C.chaterjee
4. Text Book of Chemistry & Physiology (2009) Arun book publishers.

**SEMESTER - VI**

**HOURS/ WEEK – 5  
CREDIT - 5**

## **EVOLUTION**

### **Objectives:**

It provides basic information of phylogenies and evolution and to study the geological time scale and evolution of higher organisms from lower.

### **UNIT – I**

Introduction and Theories of Evolution: Geological time scale chart, origin of life and Theories ,Lamarckism- Neo Lamarckism - Darwinism - Neo-Darwinism – Mutation Theory of Devries.

### **UNIT – II**

Evidences for Evolution: Morphological, Embryological evidences, Paleontological evidences, Fossil formations and types of fossils.

### **UNIT – III**

Species concept and speciation: Species, Subspecies and Sibling species. Deme – speciation; types of speciation: Pyretic and true speciaton – Allopatric Speciation – Sympatric speciation- Isolating mechanisms: Pre zygotic- Post zygotic.

### **UNIT –IV**

Evolutionary process: Micro and Macro evolution; Parallel evolution- Mimicry and colouration – Adaptive radiation of mammals (Fussorial, Cursorial, Aquatic &Aerial).

### **UNIT –V**

Evolution of Man: Organic evolution of man – Cultural Evolution of man – Future Evolution of man.

### **TEXT BOOKS:**

1. Bala Rastogi (2001) Organic evolution, Kedar nath & Ram Nath, Delhi
2. P.S. and Agarwal V.K. (1998) Concept of evolution, S.Chand & Co, New Delhi.
3. Ranganathan, T.K.1983 Evolution. CMS printing press.
4. Tomar , B.S. and S.P. singh Evolutionary Biology, Rastogi publications, Meerut.

**SEMESTER - VI**

**HOURS/ WEEK – 4  
CREDIT - 4**

## **IMMUNOLOGY**

### **Objectives:**

The main aim of this paper is to obtain knowledge about immune systems, cells of immunity and its role in protection of our body. Antigen, antibody concepts, hypersensitivity, MHC and complement pathways. Different immunological techniques used in the clinical testing.

### **UNIT – I**

Introduction and history, scope of immunology, definition of antigen and antibody, types of immunity – innate and acquired immunity, lymphoid organs – primary and secondary.

### **UNIT – II**

Cells of immune system: Origin of the cells, structure and types – Structure and functions of Monocytes, leucocytes, neutrophils, basophils, eosinophils, T cells and B cells.

### **UNIT – III**

Antigens and Antibodies: Types of antigens, Basic structure of immunoglobulins and its types, properties of immune response, humoral immunity and cell mediated immunity.

### **UNIT – IV**

Auto immunity: Auto immune disorders – cause Eg: Myasthenia gravis and Lupusrthematusus-Principle of Vaccination-Types of Vaccination-Transplantation immunology: organ transplantation , graft rejection.

### **UNIT – V**

Immunological techniques: Precipitation- VDRL test – ABO blood typing – Widal test-RIA, ELISA, FISH & Immunoelectrophoresis.

### **TEXT BOOKS**

1. Chakaravathy, Ashik (1996) immunology, Tata MC Graw – Hill publishing company LTD., Delhi.
2. Roit and Delves (2001) Essential immunology, Black well science, London.
3. Clark, W.R., 1991. The experimental foundations of modern Immunology, John volley & sons.
4. Roiffy, J.M.1998 Essentials of Immunology, Black well scientific publishers.
5. Immunology and serology (2011) K.R.joshi, N.O.Osam. Agrobios publishers jodhpur

**SEMESTER - VI**

**HOURS/ WEEK – 3  
CREDIT -4**

**MAJOR PRACTICAL –III  
GENETICS, DEVELOPMENTAL BIOLOGY, BIOPHYSICS, BIOCHEMISTRY  
AND BIOSTATISTICS**

**GENETICS:**

- Enumeration of Blood Group and Rh Factors.
- Identification and Recording of Mendelian traits in humans.
- Drosophila mutants, male and female identification.
- Pedigree analysis,

**DEVELOPMENTAL BIOLOGY:**

- Frog: Observation of frog's developmental stages – Egg, cleavage, Gastrulation and yolk plugs stage.
- Observation of chick developmental stages chick of embryo 24 Hrs, 48 Hrs and 72 Hrs
- Slides: T.S. of Mammalian Sperm & Ovary

**BIOPHYSICS:**

- Beer – Lambert's law verification using colorimeter.

**BIOCHEMISTRY**

- Qualitative test for proteins, lipids and carbohydrates

**MODELS**

- Model of Amino acid, Haemoglobin, and ATP.

**BIOSTATISTICS:**

Calculation of, Mean, Median, Mode. Variance, Standard deviation, Standard error from leaves specimens.

Diagram construction – Bar, Histogram, and Pie

**Text books**

1. P.S. Verma and V.K Agarwal: Genetics (S.Chand & Co)
2. B.I.Balinsky: An introduction to Embryology (Holt – Saunders international)
3. K.Vijayaraman , George john , P. Manikili, Uyiriyal, Iyarpiyal, Kaniniyin Payanpadugal. Uyiriyapulliyal (Chimera)

**SEMESTER - VI**

**HOURS/ WEEK – 3  
CREDIT - 4**

### **MAJOR PRACTICAL –IV**

#### **ANIMAL PHYSIOLOGY, MICRO BIOLOGY AND EVOLUTION**

##### **ANIMAL PHYSIOLOGY:**

1. Dissolved O<sub>2</sub> consumption by fish
2. Qualitative test for ammonia, urea and uric acid
3. Enumeration of RBC by Haemocytometer (Demo only)
4. Model: 1. Haemoglobinometer 2. Sphygmomanometer 3. Kymograph.
5. To find out the salivary activity in freshwater mussel and calculate Q<sub>10</sub>

##### **MICROBIOLOGY:**

1. Preparation of culture media and methods of sterilisation
2. Enumeration of bacteria.
3. Identification of Gram Positive and Gram Negative bacteria. (Gram staining)
4. Serial dilution technique – demonstration.
5. Model: a). Autoclave b). Petriplate c). Inoculation loop, d). Laminar flow chamber

##### **EVOLUTION:**

1. Animal of evolutionary significance: 1. Preipatus 2. Archaeopteryx
2. Homologous organ: Fore limbs of Frog and Pigeon
3. Analogous organ: Wings of insects and Birds
4. Coloration: 1. Chameleon, 2. Lycopodium
5. Mimicry: a) Leaf insect and Stick insect  
b) viceroy and monarch butterfly
6. Fossils: 1. Nautilus 2. Ammonite

##### **Compulsory study tour:**

1. A compulsory study tour to visit zoologically important place such as sea – shore, sanctuary, forest area, aquaculture farm etc., to observe and study the animals in their natural habitat.
2. The students should write an illustrated study tour report and the same is to be submitted for evaluation at the time of practical Examination

##### **TEXT BOOKS:**

1. K. Vijayaraman and K. Palanivel; Cheymurai Vilangial; A complete book (Chimera)

SEMESTER - VI

HOURS/ WEEK –4  
CREDIT - 4

## MICRO BIOLOGY

### Objectives:

These papers instruct the students the History and Scope of microbiology, Microbial Technology, Microorganisms and Environment, food microbiology, microbial diseases and treatment.

### UNIT –I

Introduction and concept of Microbiology -Scope of microbiology: classification of microbes, General structure of Bacteria, Virus & Fungi.

### UNIT –II

Characteristics of Gram + Ve and Gram -Ve bacteria, Culture medium – Types – Bacterial Growth curve, Culture methods. Microbial nutrition and its types.

### UNIT-III

Food microbiology: micro organisms of food – Microbial contamination and food spoilage, food preservation-different methods and processes of preservation

### UNIT-IV

Soil Microbiology – Soil microbes – Rhizobial Nitrogen fixation – Blue green algae as Bio fertilizer and its applications. Agricultural microbiology: Role of Micro organism in soil formation – fertility – crop protection – Biopesticides.

### UNIT –V

Microbial diseases in man

- a) **Bacterial disease:** Tuberculosis Typhoid, Leprosy.
- b) **Viral disease:** Poliomyelitis, Chicken pox, Hepatitis and AIDS.

### TEXT BOOKS:

1. M.j. Peleczar and R.D.Reid, Microbiology (Mc Graw Hill).
2. W.C.Frazier and D.C.West Goff: Food Microbiology.
3. C.B power and H .f. Daginawala: General Microbiology – Vol. I & II (Himalaya Publishing)
4. H. Evans: Introductory Microbiology (cambrige Univer – press).
5. H.G. Schlegal: General Microbiology (cambrige Univer – press).

**SEMESTER - VI**

**HOURS/ WEEK – 5  
CREDIT - 5**

## **MOLECULAR BIOLOGY**

### **Objectives:**

This course facilitates to understand the structure at molecular level and function of prokaryote and eukaryote cell. To enlighten our students about the structures and functions of cellular organelles and nucleic acids.

### **UNIT- I**

Introduction: Cell Shape, Structure and size- diversity – cell theory; isolation and growth of cell. Chromosome structure and function; specialized chromosome. Organization of chromosomes, abnormalities; numerical and structural changes.

### **UNIT –II**

DNA as the Genetic Material – replication – prokaryotic and eukaryotic DNA replication, function and modifications- protein and enzyme involved in replication, structure. DNA damage-mechanism of repair – excision repair, recombinational repair genetic code- organization of coding sequence and repetitive sequence.

### **UNIT- III**

Transcription – structure of transcriptional unit – regulatory signal elements; promoter. Post transcriptional modification of RNA. Wobble hypothesis. Translation, ribosomes and tRNA mechanism and regulation of protein synthesis. Post translational modification of protein.

### **UNIT- IV**

Concept of gene – genetic fine structure – cistron, muton and recon- exons and introns. Regulation in prokaryotes, type of gene regulation, operon concept- lac. Homologous recombination, crossing over, single point and two point.

### **UNIT- V**

**Biology of Cancer** – oncogenes and tumor suppressor gene. Programmed cell death. Apoptosis, theories regarding tumor formation. Cell differentiation. Aging theories.

### **TEXT BOOK:**

1. Essential of molecular biology, Freifelder D. (2003). Jones and Bartlet publishing.
2. Genes, Lewin B., 2007. Jones and Bartlet publishing.



**SEMESTER - VI**

**HOURS/ WEEK - 5**  
**CREDIT - 5**

## **VERMICULTURE**

### **Objectives:**

The paper has been designed to make the students to gain knowledge about various cultural aspects of earthworm and the profitable production of vermicompost.

### **UNIT - I**

Earth worms – Historical aspects – outline classification – Type study of *Megascolia lumbicidae* – Ecological classification – Epigeic, Parageic and endogeic forms – Humus feeders- humus farmers – Leaf mold.

### **UNIT -II**

Physical, chemical and biological changes brought by earthworm in soil – burrows - drilosphere – earthworm casts.

### **UNIT - III**

Optimal conditions for vermiculture – temperature, moisture, pH, soil type, organic matter, protection from sunlight, rain- Predators – Food preference -Enemies

### **UNIT - IV**

Composting: Vermicomposting, Vermiwash, Beneficial microbes in vermicomposting – advantages. Role of earthworm as biological controlling agent-.

### **UNIT-V**

Manure harvesting – Nutrients analysis – Marketing – Application – Cost benefit analysis.

### **TEXT BOOKS:**

1. Edward, C.A., and P.J. Bohlen, 1996. Ecology of Earthworm 3rd edn. Chapman and hall.
2. Ismail, S.A., 1970 Vermiculture. The biology of Earthworm. Orient Logman, London.
3. Lee, K.E., 1985. Earthworm. Their ecology and relationship with soil and land use. Academic press. Sydney.

**SEMESTER - VI**

**HOURS/ WEEK – 4  
CREDIT - 4**

## **ORNAMENTAL FISH CULTURE AND MANGEMENT**

Objectives:

This paper provides information about the cultural and economic aspects of various ornamental fishes.

### **UNIT -I**

Importance and scope of Ornamental fish culture: Economics. Commerical value and its potential, trends in ornamental fish farming in the world and in India. Important freshwater and marine ornamental fish- (Gold fish, black molly, angel fish, guppies, clown fish, butter fly fish).

### **UNIT -II**

Popular ornamental fishes: Indian market and international market – freshwater species and marine species- basics on biology, habitat aquarium compatiblity and patterns of reproduction.

### **UNIT -III**

Mass production: preparation for breeding – breeding behaviour of chosen fishes: live and preparation and egg layers- carp, fighter fish and clown fish (marine), induced breeding – food and feeding – live feeds: rotifers, tubifex and artificial feeds.

### **UNIT- IV**

Indroduction to aquarium and aquarium accessories. Aquarium design, Construction and preparation: size, shape, substrate, ornamental aquatic plants. Construction and functions of Biofilters: aerators – accessories for fish tanks – hood and lighting, nets, maintenance of water quality: controlling ammonia build up, pH, feeding regimes.

### **UNIT- V**

Diseases management: Common bacterial, viral fungal, protozoan and crustacean infections. Their treatment and control. Transporation of ornamental fishes.

### **REFERENCES:**

1. Fish and fisheries India by Jhingram V.G. Hindustan Pub. Corporation – New Delhi.
2. Hand book of fresh water fishes of India by Beaver C.P – Narena Pub. Home.
3. Santahnam *et al.*, A Manual of Freshwater Aquaculture.

## **GENDER STUDIES**

### **OBJECTIVES:**

1. To make the students to have clear understanding about Gender Equality and basic human rights.
2. To prepare them to fight against sexual harassment and realise their social responsibilities.

### **UNIT – I**

**Concept of Gender:** Sex- Gender- biological determinism- Patriarchy- Feminism- Gender -Discrimination- Gender division of labour –Gender Stereotyping – Gender sensitivity- Gender Equity- Gender mainstreaming- Empowerment.

### **UNIT- II**

**Women’s Studies Vs Gender Studies:** UGC s Guidelines- VII to XI – Plans- Gender studies: Beijing conference and CEDAW – Exclusiveness and Inclusiveness.

### **UNIT- III**

**Areas of Gender Discrimination:** Family – Sex ratio- Literacy- Health- Governance- Religion- work Vs Employment- Market- Media- Politics Law- Domestic Violence- Sexual Harassment –State Policies and Planning.

### **UNIT IV**

**Women Development and Gender Employment:** Initiatives - International Women’s Decade- International Women’s Year- National Policy for Employment of women – Women Empowerment year 2001- Mainstreaming Global Policies.

### **UNIT-V**

**Women movement and Safeguarding Mechanism:** In India National/ State Commission for women (NCW) – All women Police Station- Family Court- Domestic Violence act – Prevention of Sexual Harassment at work place- Supreme Court Guidelines – Maternity Benefit Act- PNDT Act Hindu succession Act 2005- Eve Teasing Prevention Act- Self Help Groups- 73<sup>rd</sup> and 74<sup>th</sup> Amendment for PRIS.

**REFERENCES:**

1. Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women Unlimited, 2004.
2. Rajadurai. S.V, Geetha, V.Themed in Caste Gender and Religion, Tiruchirappalli, Bharathidasan University, 2007.
3. Dr. C.Sethuraman- Gender Studies – New Century Book House.