

**H.H. THE RAJAH'S COLLEGE (AUTONOMOUS)**

**PUDUKKOTTAI – 622 001**

**(NAAC ACCREDITED WITH B+ STATUS)**



**B.Sc., ZOOLOGY**

**SYLLABUS**

*Under Choice Based credit System*

*(For the Candidates Admitted from 2015-2016 onwards)*

**CBCS - For Students Admitted in 2015-2016**  
**UG Science Programme Pattern (Botany and Zoology Majors)**

S. No	Sem	Paper	Hrs/Week	Credit	Exam hrs	Marks		
						Internal	External	Total
1	I	Part – I	6	3	3	25	75	100
2	I	Part – II	6	3	3	25	75	100
3	I	Major Paper – Invertebrata	5	5	3	25	75	100
	I	Major Paper – II (Practical – I) I & II *	3					
	I	Allied Paper – I * Botany	2					
	I	Allied Paper – II (Practical) *	3					
4	I	Environmental Science	2	2	3	25	75	100
	I	Soft Skill – I Aquaculture *	2					
5	II	Part – I	6	3	3	25	75	100
6	II	Part – II	6	3	3	25	75	100
7	II	Major Paper – II (Practical – I)* I & II	3	4	3	40	60	100
8	II	Major Paper – Chordata	6	5	3	25	75	100
9	II	Allied Paper – I * Botany	2	5	3	25	75	100
10	II	Allied Paper – II * (Practical)	3	5	3	40	60	100
11	II	Value Education	2	2	3	25	75	100
12	II	Soft Skill – II Aquaculture *	2	4	3	25	75	100
13	III	Part – I	6	3	3	25	75	100
14	III	Part – II	6	3	3	25	75	100
15	III	Major Paper – IV Cell biology	5	4	3	25	75	100
	III	Major Paper – V (Practical – II) * Cell biology & Ecology	3					
	III	Allied Paper – III * Chemistry	3					
	III	Allied Paper – IV (Practical)*	3					
16	III	Non – Major Elective - Food Preservation – <b>Self</b>	4	2	3	25	75	100
17	IV	Part – I	6	3	3	25	75	100
18	IV	Part – II	6	3	3	25	75	100
19	IV	Major Paper – V (Practical – II)* Cell Biology & Ecology	3	4	3	40	60	100
20	IV	Major Paper – IV Ecology	5	4	3	25	75	100
21	IV	Allied Paper – III* Chemistry	3	5	3	25	75	100
22	IV	Allied Paper – IV (Practical)* Chemistry	3	5	3	40	60	100
23	IV	Soft Skill – III Poultry Science	4	4	3	25	75	100
24	V	Major Paper – VII Bio Physics, Biochemistry, Biostatistics	4	4	3	25	75	100
25	V	Major Paper – VIII Developmental Biology	4	4	3	25	75	100
26	V	Major Paper – IX Genetics	5	4	3	25	75	100
	V	Major Paper – X (Practical – III)* Genetics, Development biology, bio physics, bio chemistry & bio statistics	3					
	V	Major paper – XI (Practical – IV)* Animal Physiology, Micro biology & Evolution	3					
27	V	Elective Paper – I Bio technology	5	5	3	25	75	100
28	V	Non – Major Elective - Public Health Hygiene ( <b>For Botany Student</b> )	2	2	3	25	75	100
29	V	Soft skill Apiculture & Sericulture	4	4	3	25	75	100
30	VI	Major Paper – IX (Practical – III)* Genetics, Development biology, bio physics, bio chemistry & bio statistics	3	4	3	40	60	100
31	VI	Major paper – X (Practical – IV)* Animal Physiology, Micro biology & Evolution	3	4	3	40	60	100
32	VI	Major Paper – XII Animal Physiology	5	5	3	25	75	100
33	VI	Major Paper – XIII Evolution	5	5	3	25	75	100
34	VI	Major Paper – XIV Immunology	4	4	3	25	75	100
35	VI	Elective Paper – II Vermiculture	5	5	3	25	75	100
36	VI	Elective Paper – II Micro biology	4	4	3	25	75	100
37	VI	Gender Studies	1	1	3	25	75	100
		Extension activities		1				
		Additional credit		1				
			177	140				3700

\* Exam will be held at the end of even semester

S. NO	UG ZOOLOGY	CODE
<b>I SEMESTER</b>		
1	Part I – Tamil / Hindi Paper – I	RSGTI/ RSH1
2	Part II – English Paper – I	RSGE 1
3	Major Paper – I – Invertabrata	RSZOA1
4	Environmental Studies	RSCES
<b>II SEMESTER</b>		
5	Part I – Tamil / Hindi Paper – II	RSGT2/RSGH2
6	Part II – English Paper – II	RSGE 2
7	Major Practical – I	RSZOB2P
8	Major Paper – II – Chordata	RSZOC2
9	Allied paper – I – Botany paper – I	RSBTYA2
10	Allied Practical – I – Botany Practical	RSBTYB2P
11	Value Education	RSCVE
12	Soft Skill Paper – I – Aquaculture	RSBZOEC1
<b>III SEMESTER</b>		
13	Part I – Tamil / Hindi Paper – III	RSGT3/RSGH3
14	Part II – English Paper – III	RSGE3
15	Major Paper – III - Cell Biology	RSZOD3
16	Non – Major Elective - Food Preservation – Self	
<b>IV SEMESTER</b>		
17	Part – I – Tamil / Hindi Paper – IV	RSGT4/ RSGH4
18	Part – II – English Paper – IV	RSGE4
19	Major paper – IV- Ecology	RSZOE4
20	Major Practical – II	RSZOF4P
21	Allied Paper – III – Chemistry Paper – I	RSCHYC4
22	Allied Practical – III - Chemistry Practical – I	RSCHYD4P
23	Soft Skill Paper – II Poultry Science	RSBZOEC2
<b>V SEMESTER</b>		
24	Major Paper – V – Biophysics, Biochemistry, Biostatistics	RSZOG5
25	Major Paper – VI – Development Biology	RSZOH5
26	Major Paper – VII – Genetics	RSZOI5
27	Elective Paper – I – Biotechnology	RSZOE1
28	Non – Major Elective - Public Health Hygiene (For Botany Students)	RSNMZOE02
29	Soft Skill Paper – III – Apiculture & Sericulture	RSBZOEC3
<b>VI SEMESTER</b>		
30	Major Paper – VIII – Animal Physiology	RSZOJ6
31	Major Paper – IX – Evolution	RSZOK6
32	Major Paper – X – Immunology	RSZOL6
33	Major Practical – III	RSZOM6P
34	Major Practical – IV	RSZON6P
35	Elective Paper – II – Vermi culture	RSZOE2
36	Elective Paper – III – Micro Biology	RSZOE3
37	Gender Studies	RSGS

**H.H. THE RAJAH'S COLLEGE (AUTONOMOUS)**

**PUDUKKOTTAI – 622 001**

**DEPARTMENT OF ZOOLOGY**

**Board of studies members**

<b>S. No</b>	<b>Name and Designations</b>	<b>Signature</b>
1	<b><u>Chairman</u></b> Dr.M.Palanisamy Assistant Professor & Head Department of Zoology H.H The Rajah's College Pudukkottai – 622 001 Cell – 9965793987	
2	<b><u>Member - 1</u></b> Dr.P.Raja Guest Lecturer Department of Zoology H.H The Rajah's College Pudukkottai – 622 001	
3	<b><u>Member - 2</u></b> Prof. R.Purusothaman Guest Lecturer Department of Zoology H.H The Rajah's College Pudukkottai – 622 001	

**I**

***SEMESTER***

## INVERTEBRATA

### UNIT- I PROTOZOA:

General characters and classification up to class with examples.

**Detailed study:** paramecium

**General topics:** protozoan parasites- plasmodium-life history- Pathology control measures

### UNIT-II PORIFERA AND COELENTERATA:

General characters and classification up to class with examples.

**Detailed study:** Obelia

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

### UNIT- III PLATYHELMINTHES AND ASHELMINTHES:

General characters and classification up to class with examples.

**Detailed study:** *Fasciola hepatica*

**General topic; Nematode** parasite in man

### UNIT- IV ANNELIDA AND ARTHROPODA:

General characters and classification up to class with examples

**Detailed study:** Neries

**General topics:** Adaptive Radiation in annelida

Larval forms of crustacean and their significance.

### UNIT-V MOLLUSCA AND ECHINODERMATA:

General character and classification upto class with examples.

**Detailed study:** *Asterias rubens* (sea stra)

**General topics;** Cephalopods as an advanced mollusc.

Larval forms of Echinoderms

### REFERENCES

1. Ayyar, C.K and T.N Ananthkrishnan 1992.A manual of Zoology Vol-I (Invertebrata). Parts Viswanathan pvt.Ltd.
2. Barrington, e.J.W.1979. Invertebrates. Structure and function and edn. MLBS and Nelson
3. HYMAN, I.H., 1940-1955.The Invertebrates.Vol.I to VIII McGraw Hill book Co.
4. Jordon, E.L., and P.S.Verma 1995. Invertebrate Zoology 12<sup>th</sup> edn. S.Chand&Co.
5. Kotpal, R.L., S.K., Agarwal,Khetarpal. 19989. Modern text book of Zoology.6. Rostogi Publications

## ENVIRONMENTAL STUDIES

### UNIT-I

- a) Nature of environment and environmental studies:
- b) Definition. Scope and importance: need for public awareness
- c) Renewable and non-renewable resources and their management
- d) preliminary knowledge on following resources : Forest, Water, Mineral, Food and Energy

### UNIT-II

- a) Concept of an ecosystem. Structure of an ecosystem. Producers. Consumers and Decomposers
- b) Energy flow in the ecosystem, food chains, food webs and ecological pyramids

### UNIT-III

- a) Biodiversity and its conservation – definition genetics-species and ecosystem diversity
- b) Biodiversity classification of india. Value of biodiversity; consumptive use productive use social. ethical aesthetic and option values
- c) Threats to biodiversity; habitat loss, Poaching of wildlife, man wildlife conflicts.
- d) Endangered and endemic species of India, conservation of biodiversity.

### UNIT-IV

- a) Environmental Pollution – Definition causes, effects control measures of Air pollution, Water pollution Soil pollution, Marine pollution, Noise pollution. Thermal and nuclear pollution:
- b) Solid waste management: causes, effects and control measures of urban and industrial wastes.

### UNIT-V

- a) Social issues and problems from unsustainable to sustainable development, urban problems related to energy conservation.
- b) Population growth variation among nations
- c) Population explosion – Family welfare programme
- d) Environment and human health, Human rights, Value education, HIV/AIDS, Women and child welfare.

**SOFT SKILL – I AQUACULTURE****UNIT – I**

Definition and scope of Aquaculture – importance of Aquaculture – Present status of Aquaculture in India – Water Quality Management.

**UNIT - II**

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

**UNIT – III**

Design and construction of C ulture Ponds – Pre Stocking Management – Food and feeding- importance in Aquaculture. (Live feed,Natural and Supplementary)

**UNIT – IV**

, Culture of Pearl Oyster, Edidle oyster and Sea weed culture-Prawn farming-Oranamental fishes.

**UNIT- V**

Fish preservation, Harvesting, Marketing-Fish diseases and its control -Fishery institutions(CMFRI,CIFA,CIBA,MPEDA and FSI)

**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.
2. Pillai, T.V.R.1988, Aquaculture: Principles and practices. Fishing News Books.
3. Ramasamy, P.1992. Diseases of Shirmps in Aquaculture systems. Vanitha Publications.
4. Vijayaraman, K.George John Sivkumar, P. and Rafi Mohamed, R.1999. Nanneer Eral Valarppu-AManual.Tamilnadu state Council for science and Technology
5. Arumugam N. Aqua culture Saras Publication.
6. Lagier Karl, F, 1986, Ichthyology, Wiley Interscience.



II  
**SEMESTER**

<b>SEMESTER-II</b>
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<b>HOURS/Week 6</b>
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<b>Credit 5</b>
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## **CHORDATA**

### **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) Migration of Fishes-Economic importance of fishery

### **UNIT\_III**

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

### **UNIT-IV**

General Characters and classification of Aves – Detailed study of pigeon (Excluding Endoskeleton) Migration of birds – Distribution of flightless birds.

### **UNIT-V**

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

### **REFERENCES**

1. Ekambaranathan ayyar, I 1993 – Out line of zoology - Vol- I. S.Viswanathan (printers & publication) Pvt. Ltd, Chennai.
2. Jordon, E.L. and Verma P.L (2003)- Invertebrata Zoology. S. Chand & company Ltd. Rama Nayar, new Delhi – 110 055.
3. Kumar & Asia (2000)- Biodiversity – Principles and conservation, Agrobio (India), Dodput – 342002.
4. Sharma P.D (2001) – Ecology and Environment, Rastogi publication, Meerut – 250 – 002. Gadgil M.et. al (1996) – Bio – diversity Vol – 2. India academy of science, Bangalore – 560 012

HOURS/Week 5
Credit 4

Hours/ week 4
Credit 5

## ALLIED ZOOLOGY

### ANIMAL DIVERSITY AND ECONOMIC ZOOLOGY

#### INVERTEBRATA

##### UNIT-I INVERTEBRATA: Outline Classification & General Characters

**General characters** : Protozoa & Colenterata

**Type study** : Obelia

**General topics** : Parasitic Protozoans

##### UNIT-II

**General characters** : Platyhelminthes & Annelida

**Type study** : Earthworm

**General topics** : Parasitic adaptation in liver fluke & Tape worm

##### UNIT-III

**General characters** : Arthropoda & Echinodermata

**Type study** : Cockroach

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

##### UNIT-IV VERBRATA: Outline Classification & General Characters

**General characters:** Aves

**Type study** : Frog

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

##### UNIT-V Commercial zoology; Apiculture (Bee hive and Honey extraction) Aquaculture composite fish culture & Ornamental fish culture

**General Topics** ; Sericulture (sericulture in india, uses of silk & by product of rearing)

#### REFERENCES

1. Ayyar, C.K. and T.N. Ananthkrishnan 1992. A manual of zoology Vol- I (Invertebrata).

Parts I & II. Viswanathan Pvt. Ltd. Jorden, E.L. and P.S. Verma 1995. Chordate Zoology and elements of animal physiology., S.Chand & Co David B.V and T.J Kumaraswami. 1998, elements of Economci entomology. Popular Book Depot, Madrasin, M.S., 1973, General Entomology , Oxford & TEM Rastog Economic zoology , Rostogi Publish

**SEMESTER I&II**

**INVERTEBRATA & CHORDATA  
MAJOR PRACTICAL -1**

**Hours/ week6**

**Credit 5**

**INVERTEBRATA:**

**DISSECTION:**

- Cockroach** : Nervous & Digestive System  
**Earthworm** : Nervous & Digestive System  
**Frog** : Digestive and Circulative system (CAD)

**MOUNTING**

- Earthworm** : Body setae, Pineal setae  
**Cockroach** : Mouth parts  
**Frog** : Brain ( CAD)

**SPORTTERS AND SLIDES**

**Protozoa**

- Paramecium Entire, and Paramecium 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 & Hermit Crab

**Mollusca**

- Pila, Unio, Chiton & Sepia

**Echinodermata**

- Starfish, Bipinnaria Larva & Sea Urchin

## **CHORDATA:**

### **Prochordata :**

- Amphioxus, and Ascidian

### **Fishes**

- Shark ,Echines, Exocoetus, and Hippocampus

### **Amphibia**

- Bufo, Hyla , and Ichthyophis

### **Reptilia**

- Naja Naja, Viper, Draco, and Chamaeleon

### **Aves**

- Pigeon, Feathers

### **Mammalia**

- Rabbit, Bat, and Manis

### **Dentition**

- Rabbit and Man

## **REFERENCES:**

1. P.S.Verma: Advanced Practical in Zoology (S.Chand & Co).
2. S.S.Lal: Practical Zoology: Chordates (Restogi Publications).
3. K.Vijaraman and K.Palanivel: Cheymurai vilangial: A complete Book (Chimeeraa)

**ALLIED ZOOLOGY PRACTICAL****INVERTEBRATA:**

**Cockroach** : Nervous & Digestive System

**Earthworm** : Nervous & 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, Scolexs 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 ,Echines, Exocoetus, and Hippocampus

**Amphibia**

- Bufo, Hyla , and Ichthyophis

**Reptilia**

- Naja Naja, Viper, Draco, and Chamaeleon

**Aves**

- Pigeon, Feathers

**Mammalia**

- Rabbit, Bat, and Manis

**Dentition**

- Rabbit and Man

**REFERENCES:**

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

## VALUE EDUCATION

- UNIT-I**      Meaning and nature Education: Meaning and concepts of Value education-  
origin-Classification of values – view of eminent thinkers – meaning of Value  
education need for Value education.
- UNIT-II**      Obejectives and developed of human values: Role of school and colleges in  
the development of human value- objectives of value oriented education –  
Ethical and Social values – Gandhiji 's non- violence - Gokak committee
- UNIT-III**     Strategies and approaches to value education: Role of education in school ,  
family , teacher, personal value devolpement- connectional frame work –  
strategy suggested by J.R. Frankel – NECRT approach to value Education –  
Role play technique in value education – value education –value based  
curriculum – teachers role
- UNIT-IV**     Sources of Value: Traditional Indian values, sources of value – culture,  
Education, Religion – Hinduism, christianism , Islam, Buddhism – indian  
constitutions as source for democratic value – equality – secularism,  
democracy – Research and resources in value education
- UNIT-V**      Methods of teaching document on Human value education: methods of  
teaching value education – Guidelines for developing value among students  
. problems in promoting value education – Documents of value education –  
recommendation of the committee appointed by the central advisory Board of  
Education – Recommendation of the university education commission 1964-  
1996 – National policy on Education 1986-1992

### Reference Books

1. J.C.Agarwal, Education for values Environment and Human Right, Shipra  
publication, New Delhi 2005
2. Dub S.C. Modernization and development, The search for an alternative  
paradigm, Zeebooks Ltd. London, 1988
3. Man sell R and When U, Knowledge societies: Information Technology for  
sustainable Development, Oxford University press, New York
4. World Bank Knowledge for Development World development report, Oxford Unit  
press, New York



**III**

***SEMESTER***

## SEMESTER-III

### CELL BIOLOGY

#### 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 – 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 – Biology of cancer.

#### REFERENCES

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

## **NON MAJOR ELECTIVE – FOOD PRESERVATION**

**(For Zoology Student)**

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### **UNIT –I**

General aspect of food: definition, demands, sources of food and basic food groups. Macronutrients : carbohydrates, fats and proteins, and their function, micronutrients : Vitamins and minerals and their function.

### **UNIT –II**

Inhibitory substances: Inhibitors in plant products, dairy products and animal tissue foods. Protective barriers on plant, dairy and animal food products.

### **UNIT-III**

Processing of pulses, nuts and oil seeds : preservation by freezing, heating – low and high temperature, preservatives, osmotic pressure, dehydration and irradiation

### **UNIT- IV**

Processing and preservation by sugar and sugar products by using sucrose, syrups, honey and candy.

### **UNIT – V**

Canning and bottling – processing and preservation of foods, fatty foods, essential oils, bottled beverages, spices and other condiments.

### **REFERENCES:**

- Willam C Frazer and Dannis C food Westhoff Food microbiology
- Srilakshmi B Food science. New Age International publication pvt.Ltd.

**IV**

***SEMESTER***

**ECOLOGY****UNIT-I**

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

**UNIT-II**

Biogeochemical: cycle. Carbon cycle, Nitrogen cycle, Oxygen cycle, Phosphors & Sulphurcycle

**UNIT-III**

Ecosystem : Definition - Pond as an ecosystem – Primary and secondarys production, Food chain – Food web, Tropic 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, Air, Noise and Radioactive pollution detailed and preventive measures.

Green house gases Global warming and its control measures

Wild life sanctuaries in India

**REFERENCES**

1. Rastogi V. B and M.S jayaraj 1989. Animal ecology and distributionof 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
5. publications Meerut.

**SOFT SKILL-II-POULTRY SCIENCE****UNIT-I**

Introduction – progress of poultry industry in South 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 – Food stuffs for poultry-Feed ingredients.

**UNIT-IV**

Diseases of poultry – viral, bacterial, fungal and animal parasites- symptoms and preventive measure.

**UNIT-V**

Factors affecting egg size – storage, preservation methods , marketing – grading – Economics of poultry production

**REFERENCES**

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

**MAJOR PRACTICAL –II**  
**CELL BIOLOGY AND ECOLOGY**

**CELL BIOLOGY**

- i. Chironomous larva – Mounting of polytene chromosome
- ii. Onion root tip – Squash preparation 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 Plankton/Fresh water  
Plankton

**SPOTTERS AND MODELS**

Animal association, inter tidal, fauna (Rocky, Sandy Muddyshores and for examples in each category)

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

**REFERENCE:**

1. E.D.P DeRobertes and e.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), Behind Nasrani Cinema, Chopasani Road,Jodhpur 342 002
5. K.Vijayarman and K.palanivel : Cheymurai Vilangial : A Complete book (Chameeraa)

**V**

***SEMESTER***



**BIOPHYSICS, BIO CHEMISTRY AND BIO STATISTICS****UNIT –I BIOPHYSICS**

Importance of biophysics: Colloids – Types, properties, Osmosis, Dialysis, Beer Lambert's law of light absorption – Spectrophotometry and its application – Thin Layer Chromatography, Electrophoresis (principle and Applications)

**UNIT-II BIOCHEMISTRY**

Metabolism of Carbohydrate (Glycolysis & Krebs cycle) Protein (Deamination & Transamination) and Lipid (structure of fatty acids & beta oxidation).

**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.

**UNIT –V DIAGRAMMATIC REPRESENTATION OF DATA**

Bar diagram – Pie diagram – frequency polygon – frequency curve – histogram. Measures of central tendency; mean – median, mode and standard deviation.

**REFERENCES**

1. Daniel, M., 1992 Basic Biologists' wiley International, new Delhi
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. Ramakrishnan, P. 1995 Biostatistics, saras publication, Nagarcoil
6. Gurumani N. 2005 an International to Biostatics Tamil Nadu Book House.

**DEVELOPMENTAL BIOLOGY:****UNIT –I GAMETONGENESIS AND FERTILIZATION:**

Definition – Gametogenesis in mammal- Theories of development: Structure of Mammalian sperm and ovum-Mechanism of fertilization-Role of acrosome during fertilization.

**UNIT – II CLEAVAGE, FATE MAP AND GASTRULATION:**

Planes and Patterns of cleavage – fate map of frog – Gastrulation in frog – Morphogenetic movements' 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 – placenta in mammals: Types of Placenta- concept of test tube baby – Birth control – Nuclear transplantation – stem cell culture and its uses.

**REFERENCES:**

1. Verma P.S. and Agarwal V.K. (1996). Chardata embryaology chand &Co  
Ramnagar, 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 winst on.

# 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 - shell coiling in limnea.

## UNIT – III LINKAGE, CROSSING OVER AND SEX DETERMINATION:

Linkage: Definitions – Types- Theory- Mechanism (Eg. Drosophila)

Crossing Over: Definitions – Types- Theory- Mechanism (Eg. Drosophila).

Genetic map

Sex determination: Barr body, - Chromosomal, Environmental and Hormonal. (With examples)

## 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: Karyo type – Pedigree analysis.

Syndrome: (Kline felter – Turner – Down)

Inborn error of metabolism: (phenyl ketoneuria, Alkaptonuria)

Mendelian Traits In man - Genetic counseling.- Eugenics – Euthenics.

## REFERENCES:

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

## **MAJOR ELECTIVE – I: BIOTECHNOLOGY**

### **UNIT – I INTRODUCTION:**

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

### **UNIT – II MOLECULAR PROBES:**

Southern, Northern and Weston blotting- Gene bank 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 technology.

### **UNIT-IV INDUSTRIAL BIO TECHNOLOGY:**

Types of ferment or -Ethanol and vinegar production using fermentation technology – application of biotechnology Pharmaceutical industry.

### **UNIT-V AGRICULTURAL BIO TECHNOLOGY:**

Bio fertilizers- Application of biotechnology in agriculture – Nano biotechnology and its uses.

### **REFERENCES:**

1. R.Primrose: Molecular Biotechnology (ASM press, Washington)
2. B.R Glick and J.J pastremak; Molecular Biotechnology (ASM press, Washington)
3. S. Damond and T.Nailcholl; Generic engineering (Cambrige universitypress)
4. P.K. Gupta;Elements of BIOTECHNOLOGY (Ratsyogi publication)
5. Vijayaraman, K.S.Chellammal and P.Manikilli.1998.Uyirithozhilnutpam, Chimeeraa, Trichy.
6. Biotechnology - S.S.purohzt (2010) fourth enlarged edition agrobios publishers (P) Ltd.,Jodhpur.

**SOFT SKILL – III APICULTURE AND SERICULTURE****UNIT – I**

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

**UNIT – II**

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

**UNIT – IV**

Importance of Sericulture, Sericulture industry in India, Sericulture: Introduction, Role, Culture and harvesting of mulberry – Diseases and preventive measures of mulberry.

**UNIT – V**

Silkworm: Life history of Bombyx mori – Rearing techniques of silkworm – Economic importance of silk – diseases of silk worm.

**REFERENCE**

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.

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

**GENETICS: IDENTIFICATION OF ABO BLOOD GROUPING.**

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, Gastrula ion yolk plugs stage.

Chick Egg: Observation of chick developmental stages egg 24 Hrs, 48 Hrs and 72 Hrs

Slides: T.S. of Mammalian Sperm & Ovary

Biophysics: Beer – Lambert's law verification using colorimeter.

Model: Model of Amino acids, Haemoglobin, ATP.

**BIOSTATISTICS:**

Calculation of, Mean, Mode, Median, Variance, standard deviation, standard error from leaves of plants.

Diagram construction – Bar, Histogram, and Pie

**REFERENCE**

1. P.S. Verma and V.k Agarwal: Genitcs (s.chand & co)
2. B.I.Blinsky: An introduction to Embryology (Holt – saunders internation)
3. K. Vijayaraman , George john , P. Manikili, Uririyal Iyrapiyal,Uyitiyalil Kaniniyin Payanpadugal. Uyiriyapulliyal (Chimeeraa)

**MAJOR PRACTICAL –IV****ANIMAL PHYSIOLOGY, MICRO BIOLOGY AND EVOLUTION****ANIMAL PHYSIOLOGY:**

1. O<sub>2</sub> consumption in 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 muscle and calculate Q<sub>10</sub>

**MICROBIOLOGY:**

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

**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. Lycodon
5. Mimicry: 1. Leaf insects 2. Stick insects
6. Fossils: 1. Nautilus 2. Ammonite
- 7. Compulsory study tour:**
  1. A study tour compulsory to visit zoologically important place such as sea – shore, sanctuary, forest area 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

**REFERENCE:**

1. Agarwal, R.A., A.K. srivastava and kaushal kumar \, Animal physiology and Biochemistry (3<sup>rd</sup> Edition), S.chand & co, Ltd, 7361 Ram Nagar, New Delhi -110 055
2. C.B. powel and H.F. Dagainawala; General Microbiology Vol. I & II (Himalaya publishing Co)
3. K. Vijayaraman and K. palanivel; Cheymurai Vilangial; A complete book (Chimeeraa).

# PUBLIC HEALTH AND HYGIENE

## 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 of special groups – Balanced diet.

## UNIT- II

### **Environment and Health Management**

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

**Air:** Ventilation, discomfort prevention

**Soild Waste:** Excreta diaposal methods

**Noise pollution:** Effects and treatment

## UNIT – III

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

**Intestinal infections:** Poliomyelitis, cholera, Typhoid, Amoebiosis

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

**Zoonosis:** Rabis, Encephalitis and plague

## UNIT – IV

Non communicable Diseases: Coronary heart diseases, Hypertension,diabetic mellitus,obesity, stroke,blindness

## UNIT –v

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

**Mental Health:** Alcohol and drug aduses

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

## References:

Baauman, 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.



**VI**

***SEMESTER***

**ANIMAL PHYSIOLOGY****UNIT – I NUTRITION, RESPIRATION AND CIRCULATION:**

**Nutrition** – Type 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, – Heart diseases.

**UNIT II EXCRETION, OSMOREGULATION AND MUSCLE PHYSIOLOGY:**

**Excretion**–Kinds of excretory products –Ultra structure of Nephron, Mechanism urine formation in man.

**Osmoregulation** – Osmoionic regulation in fresh water and marine fishes

**Muscle** – Type of muscles - Ultra structure and physiology of construction of skeletal muscles.

**UNIT- III NERVE PHYSIOLOGY AND RECEPTORS:**

**Nerve** – Neuron –Types of conduction - Nerve impulse – synaptic transmission- Reflex action

**Receptors** – phono and photo receptors (structure and function).

**UNIT – IV ENDOCRINE PHYSIOLOGY:**

**Endocrine glands:** structure and function of pituitary, Thyroid, parathyroid, pancreas, Adrenal, Testes and Ovary – Estrous cycle, menstrual cycle, pregnancy, Lactation and Menopause

**UNIT – V CHRONOBIOLOGY AND ANIMAL BEHAVIOURS:**

**Biological Rhythms**, Circadian Rhythm, Lunar Rhythms, Circannual Rhythms Biological clock – Types of behavior, Tropism, Reflexes learning, behavior and types.

**REFERENCE**

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.

**EVOLUTION****UNIT – I INTRODUCTION AND THEORIES OF EVOLUTION:**

Theories of origin of life – Geological time scale chart – Neo Lamarckism – Lamarckism – Darwinism -Neo-Darwinism – Mutation theory of Devries.

**UNIT – II EVIDENCES FOR EVOLUTION:**

Morphological – Embryological evidences; Paleontological evidence; Fossil formations- Type of Fossils

**UNIT – III SPECIES CONCEPT AND SPECIATION**

Species concept: Subspecies – 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:**

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

**REFERENCE**

1. Bala Rastogi (2001) organic evolution, Kedar nath, ram Nath, Delhi
2. P.S. and Agarwal V.K.(1998) concept of evolution, S.chand and company Ltd., Ram nagar, New delhi.
3. Ranganathan, T.K.1983 evolution. CMS printing press.
4. Tomar , B.S. and S.P. singh Evolutionary Biology, Rastogi publications Gangotri, Shivaji – Meerut – 250 002

# IMMUNOLOGY

## UNIT –I INTRODUCTICION

History and scope of immunology and types of immunity – innate, Acquired, immunity, lymphoid organs – primary and secondary.

## UNIT – II CELLS OF THE IMMUNE SYSTEMS

Origin of the cells , Stem cells, cells of the immune system – structure and types – Monocytes,leucocytes , neutrophils, basophils, eosinophils, T cells and B cells

## UNIT – III ANTIGENS AND ANTIBODIES

Basic structure of immunoglobulins and its type's properties on immune response, humoral immunity and cell mediated immunity.

## UNIT – IV AUTO IMMUNITY

Auto immune disease – cause Eg:Myasthenia gravis & Lupusrthematusus-Principle of Vaccination-Types of Vaccination-Transplantation immunology–organ transplantation – graft rejection.

## UNIT – V IMMUNOGICAL TECHNIQUES

Precipitation- VDRL tests – ABO blood typing – Widal test – RIA - ELISA – FISH&Immunoelectrophoresis.

## REFERENCES

1. Chakaravarthy, ashik (1996) immunology, Tata MC Graw – Hill publishing company LTD., Delhi.
2. Rogt and Delves (2001) Essential immunology, Black well science, London.
3. Dulsy fathima, 1. And N.Arumugam, 1998 immunology – sara publications.
4. Clark, W.R.,1991 The experimental foundation s of modern immunology,john volley & sons.
5. Roiffy, J.M.1998 Essential immunology, Block well scientific publishers.
6. Immunology and serology (2011) K.R.joshi, N.O.Osam. Agrobios publishers jodhpurn -342003

**SEMESTER VI**

**Hours/Week 5**

**Credit 5**

**SOFT SKILL –II VERMICULTURE:**

**UNIT – I**

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

**UNIT –II**

Physical, chemical and biological changes brought by earthworm 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 – required methods – advantages. Role of earthworm as biological controlling agent-Vermiwash.

**UNIT-V**

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

**REFERENCE**

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

# MICRO BIOLOGY

## UNIT –I

Introduction & Concept of Micro biology -Scope of microbiology: General structure of Bacteria, Virus & Fungi.

## UNIT –II

Gram + Ve and Gram -Ve bacteria- Culture medium – Types – Growth Curve- Culture Techniques.

## UNIT-III

Food microbiology – micro organisms of food – food spoilage,- food poisoning& food preservation.

## UNIT-1V

Soil Microbiology –Soil microbes - Nitrogen fixation – Bio fertilizer Agriculture Microbiology Role of Micro organism in soil formation – fertility – crop production – Biopesticides.

## UNIT –V

Microbial diseases in man

### a) Bacterial disease

Diphtheria, Whooping cough, Tuberculosis Typhoid, Leprosy, Syphilis and Gonorrhoea.

### b) Viral disease

Poliomyelitis, Chicken pox, Measles, Mumps, Influenza and I Hepatitis.

## REFERENCES

1. M.j. Pelezar 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 ).

# ÃVoª i\_s

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