



ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN

(Autonomous)

(Re-Accredited with 'A' Grade by NAAC)

(A Government Aided College - Affiliated to Mother Teresa Women's University, Kodaikanal)

CHINNAKALAYAMPUTHUR (PO), PALANI -624 615.

PG DEPARTMENT OF ZOOLOGY



SYLLABUS

B.Sc (ZOOLOGY) - 2014-2017

P.G DEPARTMENT OF ZOOLOGY

UG SYLLABUS 2014-17

SEMESTER - I **PAPER - I INVERTEBRATA I**

Sub Code :

Contact hours : 6 / week

Contact hours : 72 / semester

OBJECTIVES:

- ❖ To enable the students to understand the classification of animals.
- ❖ To acquire the knowledge about invertebrates and their diversity.
- ❖ To understand the economic importance of invertebrates.

Unit I:

17hrs

Taxonomy:

Introduction to Principles of Taxonomy –Principles of classification and Binomial Nomenclature - Protozoa, Metazoa, Radiata, Bilateria, Acoelomata, Pseudocoelomata, Coelomata.

General characters and outline classification up to class level with one example – Protozoa, Porifera, Coelenterata, Platyhelminthes, Nematoda and Annelida.

Unit II:

15hrs

Protozoa : Type Study - Paramecium

General topic : Protozoan parasites: Plasmodium,

Porifera : Type Study – Ascon sponge - Leucosolenia

General Topics: Canal System in sponges

Unit III:

15hrs

Coelenterata : Type study - Obelia colony

General topic : Polymorphism in Coelenterata, Coral reefs

Unit IV :**15hrs**

Helminthes : Type study – Liver fluke - External morphology – Digestive, Excretory & Reproductive systems & Life history

General Topics: Parasitic adaptations – *Wuchereria bancrofti*

Type study : *Ascaris* – Sexual dimorphism, Reproductive system and Life cycle.

Unit V:**10hrs**

Annelida : Type study – *Megascolex* – Setae, Nephridia, Nervous & Reproductive system only.

General topic : Metamerism in Annelida

Text Book :

1. N.C.Nair et al., (2010) , Text book of Invertebrates, Saras Publication.

Reference Books:

1. M.Ekambaranatha Ayyar & T.N.Ananthkrishnan., Invertebrata, Vol I (1985), , Printers & Publishers) Rt.Ltd. Chennai.
2. E.L.Jordan, P.S.Verma., (2011), Invertebrate Zoology, S.Chand & Co., Ltd, New Delhi

SEMESTER - I
PAPER – II INVERTEBRATA II

Sub Code :

Contact hours : 6 / Week
Contact hours : 72 / semester

OBJECTIVES:

- ❖ To enable the students to understand the classification of animals.
- ❖ To acquire the knowledge about invertebrates and their diversity.
- ❖ To understand the economic importance of invertebrates.

Unit I:

12hrs

General characters and outline classification up to class level with following example – Arthropoda, Mollusca and Echinodermata

Unit II:

15hrs

Arthropoda: Type Study – Prawn

General Topics: Peripatus and its Affinities

Respiration in Arthropoda

Insect Metamorphosis

Unit III:

15hrs

Beneficial Insects: Honey bee and Lac insect

Economic importance of insects

Social life of Insects

Harmful Insects: Pest of Paddy: *Tryporyza*

Pest of Coconut: *Oryctes rhinoceros*

Unit IV :

15hrs

Mollusca: Type Study : Pila

General Topics: Pearl culture

Economic importance of Mollusca

Cephalopods as advanced Molluscs

Unit V:**15hrs**

Echinodermata: Type study – Star Fish

General topic: Larval forms in Echinodermata

Text Book :

1.N.C.Nair et al., (2010) , Text book of Invertebrates, Saras Publication.

Reference Books:

1. M.Ekambaranatha Ayyar & T.N.Ananthakrishnan., Invertebrata, Vol II (1985), , Printers & Publishers) Rt.Ltd. Chennai.
2. E.L.Jordan, P.S.Verma., (2011), Invertebrate Zoology, S.Chand & Co., Ltd, New Delhi

B.Sc., ZOOLOGY ANCILLARY
SEMESTER - I
PAPER I
INVERTEBRATA, CHORDATA, CELL BIOLOGY, GENETICS &
EVOLUTION

Sub Code:

Contact Hours : 5 / week

Contact Hours: 60 / semester

Unit – I:

15 hrs

INVERTEBRATA

Outline Classification of Animal Kingdom.

Diagnostic Characters of each Phylum

External Morphology of the following a) Amoeba b)Sponge c) Obelia d) Liver flukee) Earthworm f) Ascaris g) Prawn h) Pila i) Starfish.

Unit – II:

15hrs

CHORDATA

Outline Classification of chordates upto class level.

External Morphology of the following

a) Balanoglossus b) Ascidian c) Amphioxus d) Shark e)Frog f) Calotes

g) Pigeon h) Rabbit.

Unit – III:

15hrs

CELL BIOLOGY

Ultra Structure and Functions of Plasma Membrane, Mitochondria, Golgibody, Endoplasmic reticulum, Ribosomes& Nucleus.

Unit – IV:

5hrs

GENETICS

Laws of Mendel – Monohybrid ratio, Dihybrid ratio, Sex – Linked Inheritance in Man, Sex Determination in Man.

Unit – V:

10hrs

EVOLUTION

Lamarckism and Darwinism

Evolution of Man – Cultural & Organic

Text books:

1. N.C.Nair et al., A Text book of Invertebrates, (2013), Saras Publication.
2. Dr.A.Thangamani,et al., (2013), Chordate Zoology , VII Ed.,Saras Publication
3. N. Arumugam, (2005) - Cell Biology & Molecular Biology, Saras Publication.
4. R.P.Meyyan., (2013). Genetics, Sras Publication, Nagerkoil, VII Ed.,
5. Organic Evolution : N.Arumugam, (2005), Organic Evolution, Saras Publication.

SEMESTER II

PAPER III - CHORDATA

SUBCODE :

Contact hours : 6/ Week

Contact hours : 72/ semester

Objectives :

- ❖ To make the students to appreciate the basic concepts of Chordate diversity.
- ❖ To acquire knowledge about various habits and adaptive radiations of vertebrates.

Unit I:

20hrs

Chordata characteristics: Outline classification upto order level with examples.

Type study : Prochordata: *Amphioxus*.

General Topics : Affinities of Hemichordata

Agnatha : *Petromyzon* – Salient features only

Type study : Shark

General topics : Migration of Fishes

Unit II:

15 hrs

Dipnoi : Distribution and Affinities

General Topics : Origin of Amphibia

Parental care in Amphibia

Unit III:

15 hrs

Type study : Calotes – External Morphology, Circulatory system,
Nervous system, Skull, Pectoral & Pelvic Girdles only.

General topics : Mesozoic Reptiles – Adaptive radiation and Extinction

Identification of Poisonous and Non- Poisonous Snakes with examples,
Poisonous Apparatus & Biting mechanism - First aid

Unit IV:

10hrs

Type study : Pigeon (External Morphology, Respiratory system)

General topics : Flight adaptation in birds

Flightless birds

Fossil bird – Archaeopteryx as Connecting Link

Unit V:

12 hrs

Type study: Rabbit – External morphology, Circulatory system,
Digestive system, Reproductive system

General Topics: Marsupials, Monotremes – Salient features.

Dentition in Mammals

Stomach in Mammals

Adaptations of Aquatic mammals

Text Book:

1. Dr.A.Thangamani,et al., (2013), Chordate Zoology , VII Ed., Saras Publication

Reference Books:

1. M.Ekambaranatha Ayyar & T.N.Ananthkrishnan., (1985), Printers & Publishers) Rt.Ltd. Chennai.
2. E.L.Jordan, P.S.Verma., (1986), Chordate Zoology, S.Chand & Co., Ltd, New Delhi

SEMESTER -II

PRACTICAL – I

PAPER - IV

INVERTEBRATA AND CHORDATA

SUBJECT CODE:

CONTACT HOURS: 5 / Week

CONTACT HOURS: 60 /Semester

INVERTEBRATA

Dissections: 1. Earthworm – Nervous system.

2. Cockroach– Nervous system, Digestive system (Demo only)

Mountings: 1. Earthworm : Body setae, Penial setae

2. Cockroach : Mouthparts, Trachea

3. Prawn : Appendages

Spotters:

1. Protozoa : Paramecium, Paramecium. Conjugation, Paramecium - Binary fission.
2. Porifera : Sponge gemmule, Sponge spicules, Sycon
3. Coelenterata : Obelia entire, Physalia, Porpita, Sea anemone, Aurelia, Madrepora, Obelia medusa.
4. Platyhelminthes: Liverfluke, Tapeworm.
5. Aschelminthes: Ascaris (Male and female), Filarial worm, Enterobious
6. Annelida : Leech, Trocophore larva Megascolex, peripatus.
7. Arthropoda : Prawn, Nauplius larva, Zoea Larva, Crab, Bombyx mori, Honey bee, Lac insect.
8. Mollusca : Pila, Radula, Pearl oyster, Sepia, Octopus.
9. Echinodermata : Starfish, Sea urchin.

CHORDATA

Dissections: Frog – Demonstration of Arterial system & Venous system (Visual Aid / Virtual dissection)

Mountings: Placoid scales.

Spotters:

1. Prochordata : Amphioxus, Ascidian Balanoglossus Tornaria larva
2. Pisces : Shark, Ray, Echinus, Hippocampus, Edible fishes – Anabas, Saccobranchus, Trichiurus navala.
3. Amphibian : Salamander, Ichthyophis, Frog, Bufo
4. Reptilia : Naja naja, Viper, Draco, Chamaelon
5. Aves : Pigeon.
6. Mammalia : Bat, Rabbit
7. Dentition : Rabbit, Dog & Man
8. Osteology : Pigeon - Synsacrum
Rabbit – Pectoral & Pelvic girdles, Forelimb& Hind limb bones

Students will be introduced to learning of dissections / anatomy adapting CD'S / Web sources.

B.SC., ZOOLOGY ANCILLARY

SEMESTER - II

PRACTICAL I

Invertebrata, Chordata, Cell biology, Genetics and Evolution

Subject Code :

Contact Hours : 5 / week

Contact Hours : / semester

Dissection

Cockroach - Digestive System and Nervous system

Frog - Arterial System (Visual Aid / Virtual Dissection)

Mounting

Earthworm - Body setae, Penial setae

Cockroach - Salivary glands.

Frog - Mounting of brain(Visual Aid / Virtual Dissection)

Spotter

Amoeba, Gemmule, Obelia colony, Obelia medusa , liver fluke, Ascaris entire(Male and female), Earthworm,Prawn entire, Pila,Starfish (Oral and aboral view), Balanoglossus, Asician, Amphioxius, Scoliodon, Placoid scale, Frog, Calotes

Cell biology:

Observation of Lymphocyte in Man.

Cell organelles – Mitochondria, Golgi bodies ,Endoplasmic reticulum, Ribosomes and Nucleus.

Genetics:

Examples in Sex linked Inheritance in Man. Colourblindness, Haemophilia

Evolution:

Example for Lamarckism (Giraffee)

SEMESTER -III

PAPER - V

DEVELOPMENTAL BIOLOGY

Subject Code:

Contact Hours: 6 /week

Contact Hours: 72 / semester

Objectives :

- ❖ Embryological processes of different organisms are described.
- ❖ Developmental patterns are well explained.
- ❖ To appreciate and accept the origin of life and Evolutionary processes.

Unit – I

15hrs

Basic concepts of Embryology: History of Embryology.

Theories - Preformation, Epigenesis, Mosaic, Regulative gradient Theories.

Von Baer's Law and Biogenetic law.

Gametogenesis:

Spermatogenesis, Oogenesis and types of

Sperm and Ovum (Amphioxious, Frog, Chick and Man).

Unit – II

12hrs

Fertilization:

Types, Mechanism of Fertilization, Theories of Fertilization.

Parthenogenesis - Natural and Artificial Parthenogenesis.

Cleavage:

Planes and pattern of Cleavage in frog, Factors influencing

Cleavage (Yolk).

Unit III

15hrs

Blastulation : Types of Blastula, Blastulation in Frog

Gastrulation : Fatemap – Morphogenetic Movements, Gastrulation in frog.

Unit – IV**15hrs****Organogenesis:**

Formation of Primary Organ Rudiments, Development of Heart, Eye in Frog. Development and Significance of Foetal Membranes in Chick, Placentation in Mammals.

Unit – V**15hrs****Experimental embryology:**

Organizer concept - Spemann experiments
Regeneration in Salamander limbs, Metamorphosis of Frog

Applied embryology

IVF - Test tube baby, Birth control methods.

Text Book:

1. Dr.N.Arumugam, (2013), Developmental Zoology. Saras publication, Nagercoil.

Reference Books :

2. P.S. Verma and V.K.Agarwal, (1975) , Choradate Embryology , X Ed., S.Chand & Company Pvt.Ltd. Ramnager, New Delhi.
3. Dr. R.C. Delala and R.Verma., (1986-87), A Text Book of Chordate Embryology. VI Ed., Jai Prakashnath &Co.,Meerut city, India.

SEMESTER – III
ELECTIVE I - SERICULTURE

Sub Code :

Contact Hours : 3 / week

Contact Hours : 48 / semester

Unit :1

4 hrs

Classification of Mulberry. Moriculture, Methods of Cultivation, Diseases of
Mulberry - Bacterial, Viral and Nematode

Unit : 2

8 hrs

Silkworm biology - Taxonomy, Life Cycle, Anatomy.
Diseases of *Bombyx mori* (Bacterial, Viral and Fungi),
Pests of Silkworm - Uzifly

Unit : 3

8 hrs

Seeds / Silkworm eggs. Structure - Commercial and Reproductive seeds.
Voltinism. Hibernating and Non-Hibernating eggs,
Moth Emergence and Moth Examination.
Artificial Hatching methods - Hot Acid treatment, Cold Acid treatment.

Unit : 4

8 hrs

Rearing : Rearing House and Appliances, Rearing processes - Chawkiworm rearing - Optimum
Feeding. Optimum Environmental conditions, Care during Rearing and Cleaning,

Selection of Ripe Worms, Spinning, Mounting, Harvest, Storage and Transport. Rearing of Late Age
Worms : Shoot Rearing, Shelf Rearing, Floor Rearing.

Cocoons Marketing.

Unit : 5**8hrs**

Reeling - Stifling, Reeling appliances - Types of Croissures, Country Charka, Cottage basin, Filature units. Byproducts of Silk Reeling.

Text Book:

1. G.Ganga (2003), Comprehensive Sericulture, Volume - 1 & Volume - 2,
Oxford & IBH Pub.,Co.,Pvt.,Ltd.,

Reference Books:

1. S.Krishnaswamy et al.(1972).Sericulture manual - 1(Mulberry Cultivation),
manual - 2 (Silkworm rearing) & manual -2 (Silk reeling).Food and
Agriculture Organisation of the United Nations, Rome.
- 2.Text book of Tropical Sericulture (1975) Japan Overseas Corporation
Volunteers 4 - 2, Hiroo,Sibuya Ku,ToKYO,Japan.
- 3.Sericulture in India,Venkata Narasaiah (2003), Ashish Publishing House
New Delhi.

PART III
SEMESTER III
NON MAJOR ELECTIVE - I
SERICULTURE

Sub code :

Contact hours: 2 / week

Contact hours: 24 / week

Unit I:

4hrs

Introduction to Sericulture- History and present status of Sericulture
Silkworm morphology, life cycle of Silkworm

Unit II:

4hrs

Grainage- Reproductive seeds & Industrial seeds – Voltinism- Univoltine,Bivoltine,Multivoltine eggs

Unit III:

4hrs

Rearing- Rearing houses- Appliances-Types of Brushing and Rearing,
Rearing of Chawkiworm,Rearing of Late Age worms-Shelf Rearing &
Shoot Rearing , Care during Rearing and Cleaning.

4hrs

Unit IV:

Optimum feeding and Environmental conditions, Selection of Ripe worms, Spinning, Mounting,
Harvest, Storage, Transport& Marketing.

Unit V:

4hrs

Silkworm diseases.Flacherie,Muscardine,Uzifly attack. Prevention and Control.

Text Book:

1. Comprehensive Sericulture, G.Ganga (2003) Volume - 1 & Volume - 2,
Oxford & IBH Pub.,Co.,Pvt.,Ltd.,

Reference Books:

- 1.S.Krishnaswamy et al.(1972).Sericulture manual - 1(Mulberry Cultivation),
manual - 2 (Silkworm rearing) & manual -2 (Silk reeling).Food and
Agriculture Organisation of the United Nations, Rome.
- 2.Hiroo,Sibuya Ku, (1975), Text book of Tropical Sericulture, Japan Overseas Corporation
Volunteers 4 - 2, ToKYO,Japan.
3. Venkata Narasaiah (2003),Sericulture in India, Ashish Publishing House
New Delhi.

Semseter - III

SBS (Skill Based Subject)

VERMITECHNOLOGY

Sub code :

Contact hours: 2 / week

Contact hours: 24 / week

Unit I:

Introduction Trophic Classification of Earthworms, Drilosphere, Physical effect of Earthworm on Soil.

Unit II:

4hrs

Worms for Vermiculture, Compost producing Earthworm species. Earthworm Breeding, Vermicompost and Collecting local Earthworms

Unit III:

4hrs

Vermiculture starting step, Preparing of Vermibeds, setting up of a Vermiwash unit

4hrs

Unit IV:

Effect of Vermicompost on Plant growth & Vegetables. Impact of Chemicals on Earthworms.

Unit V:

4hrs

Agriculture importance of Vermicompost and Vermiwash,

Earthworms : Uses and Potential.

Earthworm in Medicine, Earthworm as feed.

Reference Books:

1. Arun.K.Sharma, (2004), Biofertilizers for sustainable Agriculture, Agro bios, Jodhpur
2. Gupta, P.K., (2004), Vermicomposting for sustainable Agriculture, Agro bios, Jodhpur

SEMESTER - IV

PAPER VI - GENETICS

SubCode :

Contact Hours : 4 / week

Contact Hours : 48 / semester

Objectives :

- ❖ To provide basic knowledge about hereditary and environmental variations
- ❖ To help the students to appreciate the expressions of Genes.
- ❖ To understand the Genetic and Non-Genetic basis of various characters

Unit –I

10hrs

Historical background of Genetics - Vapour and Fluid theories, Magnetic Power theory, Germplasm theory. Mendel's Law of Inheritance - Gregor Mendel's life, Monohybrid cross and Law of Segregation, Dihybrid Cross and Law of Independent Assortment, Back Cross and Test Cross.

Unit – II

10 hrs

Gene interactions - Allelic interaction - Incomplete dominance, Codominance, Lethal genes, Pleiotropism - Non-allelic Gene Interaction - Dominant and Recessive Epistasis, Complementary Gene Interaction, Supplementary Gene Interaction.

Unit – III

8 hrs

Multiple alleles - A , B , O and Rh blood group, Polygenic Inheritance -
Inheritance of Skin Color in Man.

Unit –IV

10hrs

Linkage - Definition, Coupling and Repulsion, Types of Linkage - Complete and Incomplete Linkage in Drosophila, Crossing Over - Definition, Kinds of Crossing Over, Cytological Basis of Crossing over in Drosophila. Sex Determination in Man and Drosophila. Sex Linked Inheritance in Man- Colour Blindness and Hemophilia. Extra Chromosomal Inheritance - Kappa particles in Paramecium and Shell Coiling in Snail.

Unit – V

10hrs

Twin studies - Monozygotic and Dizygotic Twins.

Syndromes – Down's Syndrome, Klinefelter's Syndrome, Turner's Syndrome.

Pedigree chart - Eugenics - Positive and Negative Eugenics, Inbreeding and Outbreeding.

Text Book:

R.P.Meyyan., (2013). Genetics, Sras Publication, Nagerkoil, VII Ed.,

Reference Books:

1. P.S.Verma& T.K.Agarwal., (2007).S.Chand & Co., New Delhi.
2. Mckusick, V.A., (1968) Human Genetics, Prentice- Hall of India Private Limited, New Delhi.

SEMESTER - IV

PAPER – VII

Practical – II

DEVELOPMENTAL BIOLOGY & GENETICS

SubCode :

Contact Hours : 5 / week

Contact Hours : 60/ semester

Developmental Biology:

1. Observation of types of Eggs and Sperms
2. Temporary Mounting of Chick Blastoderm.
3. Observation and study of prepared Micro Slide - Frog.

Two cell stage

Four cell stage

Blastula

Gastrula

4. Observation of Chick Blastoderm

24 hrs

48 hrs

72 hrs

96 hrs

Genetics:

1. Mendal's Law of Segregation with beads of two different Colours
2. Correlation Coefficient of Height & Weight of the students
3. Observation of Simple Mendelian Traits

Spotters:

ABO Blood group, Barr body, Down syndrome, Klinefelter's Syndrome, Turner's Syndrome, Pedigree chart, Shell coiling – Snail limnaea.

Sex linked inheritance in Man – Colour blindness & Haemophilia.

SEMESTER - IV

ELECTIVE II - BIOSTATISTICS

SUB CODE:

CONTACT HOURS: 3 /week

CONTACT HOURS: 36 /semester

Objectives :

- ❖ To enable the students to understand the data collection and analysis
- ❖ To ensure the students to have the knowledge of putting the result into statistical way.

UNIT I:

8 hrs

Introduction to Biostatistics, Collection of Data, Sampling methods, Diagrammatic and Graphical representation.

Unit II

10hrs

Measures of Central Tendency- Mean, Median and Mode.

Measures of dispersion : Standard Deviation, Standard Error &

Coefficient of Variation.

Unit III

10hrs

Probability- Addition theorem and Multiplication theorem, Binomial Distribution, Normal Distribution and Poison Distribution.

Unit IV:

10 hrs

Chi-square test, Student 't' test.

Unit V:

10 hrs

Correlation - Definition, Types of Correlation, Karl Pearson's Co-efficient of Correlation.

Text Book:

1. P.Ramakrishnan., (2010)., Biostatistics, Saras Publication.

REFERENCE BOOKS:

2. S.Palanichamy & M.Manoharan., (1990), Statistical Methods for Biologists, I Edition, Palani Paramount Publications.
3. Veer Bala Rastogi., (2009)., Fundamentals of Biostatistics, Ane Books Pvt. Ltd.

Semester IV
NON MAJOR ELECTIVE - II
HUMAN REPRODUCTIVE BIOLOGY

Subject Code:

Contact Hours : 2 / week

Contact Hours : 24 / semester

Unit -I

Nutrition:

6 hrs

Composition of food and balanced diet.

Vitamins deficiencies

Unit – II

6 hrs

Reproduction:

Male and Female Reproductive Systems

Secondary sexual characteristics

Pregnancy, Childbirth & Lactation and Birth control

Unit – III

4hrs

Hormones:

Sex hormones

Hormonal control on reproduction - Disorders of Hormonal imbalance.

Adolescence Psychology & Menopause

Unit – IV

4hrs

Sexual diseases:

AIDS - Causes and Preventive measures

Counseling,

Unit – V

4hrs

Infertility and IVF:

Infertility, Counseling and Test tube babies

Test Tube Baby Centers in India

Reference Book:

1. Saratha Subramaniam, (2005), Human physiology, S.Chand & co
2. Dr.N.Arumugam (2013), Animal Physiology, Saras Publication

Semseter - IV

SBS (Skill Based Subject)

APICULTURE

Sub code :

Contact hours: 2 / week

Contact hours: 24 / week

Unit I:

4 hrs

Introduction to Apiculture –Scope of Apiculture. Honey bee – Classification, types of honey bees – *Apis dorsata*, *Apis florea*, *Apis indica* and Dammer bee.

Unit II:

4 hrs

Apis indica – Social life of Indian Honey Bee. Morphology of Queen, Drones and Workers.

Unit III:

4 hrs

Apis indica – Foraging behavior of Bees. Morphology of Queen, Drones and workers.

6 hrs

Unit IV:

Bee keeping – Methods of bee keeping in India – Primitives hives – Wall type, Movable type, Bamboo hive. Modern hives – Longstroth ten frame hive, Newton's hive. Appliances used in Bee keeping

Unit V:

6 hrs

Economic importance of Bee products – Chemical composition, Nutritive value and Medicinal uses of Honey, Bees Wax and Bee Venom and Disease of Honey Bees

Reference Books:

1. Dr.N.Arumugam, Dr.S.Murugan, Dr.J.Johnson Rajeshwar and Dr.R.ram Prabhu, (2005), Applied Zoology, Saras Publication, Nagerkovil.
2. Dhama.P.S & Dhama.J.K, (1976). Invertebrate Zoology, R.Chand & Co., Publishers, New Delhi
3. Ekambaranathayyar. M. (1973). A manual of Zoology Vishwanathan Printers and publishers private Ltd., Chennai.

SEMESTER -V

PAPER - VIII

BIO CHEMISTRY

Sub Code:

Contact Hours : 5 / week

Contact Hours : 60 / semester

Objectives :

- ❖ To know the chemical basis of biological phenomena.
- ❖ To enable the students to understand the metabolic cycles.
- ❖ To learn about the regulation of body functions.

Unit – I

15 hrs

Carbohydrates and Carbohydrate metabolism :

Structure, Outline Classification and Biological importance.

Glycolysis, Kreb's cycle.

Unit – II

Amino acids & Proteins:

10 hrs

Amino acids: Structure, Properties, Classification

Proteins : Structure, Properties and Classification and Biological importance.

Unit – III

15 hrs

Lipid and Lipid metabolism:

Structure, properties, classification and Biological importance

β - Oxidation of Palmitic acid.

Unit – IV

10 hrs

Hormones:

Hormones – Pituitary hormones, Adrenal hormones, pancreatic hormones, Gonadal hormones, Mechanism of Protein Hormone Action.

Unit – V

10hrs

Enzymes and Vitamins :

Classification, Mechanism of enzyme action, Factors affecting enzyme activity. Coenzymes and Isoenzymes,

Vitamins –Fat soluble and Water soluble vitamins

Text Book :

1. N. Arumugam et al., (2013), Text book of Biochemistry, Saras publications.

Reference Books :

1. Dr. (Mrs) Ambika shanmugam., (2003) , Fundamentals of Biochemistry, Kartik offset printers, 12 Aranganathan subway road, Chennai.
2. Evic.E.Conn, paul, K,stumpf, George bruening Roy H.Do, (1976), Wiely easter, Delhi.

SEMESTER –V

Paper – IX CELL BIOLOGY

Sub code :

Contact hours: 5 / week

Contact hours: 60 /semester

Unit I

10hrs

Discovery of Cell & Cell theory, Prokaryotes (E.coli), Eukaryotes (Animal cell). Microscopy – Principle & Application of Microscopy - Compound and Electron microscopes.

Unit II

Cytological Techniques - Fixation, Chemical Fixation, Fixation by Freezing. Stains – Acidic, Basic, Neutral and Vital stains. Mechanism of Staining, Cytochemical Staining Methods – Detection of proteins, Lipids, Carbohydrates & Nucleic acids. Microtomy & Microtomes.

Unit III

15 hrs

Ultrastructure and functions - Plasma membrane, Endoplasmic reticulum, Lysosomes, Ribosomes, Golgicomplex and Mitochondria.

Unit IV

15hrs

Ultrastructure and functions - Nucleus, Nucleolus, Centrioles, Chromosomes - Structure & types - Giant Chromosome, Lamp brush Chromosome.

Unit – V

10hrs

Cell divisions - Mitosis & Mitotic apparatus, Meiosis and Synaptonemal complex. Cell cycle, Cancer cells - properties, types, oncogenes and cellular ageing.

Text book:

1. N. Arumugam, (2005) - Cell Biology & Molecular Biology, Saras Publication.

Reference Books:

1. P.S.Verma V.K.Agarwal, (2011), Cytology, S.Chand & Co., New Delhi
2. R.C.Delela & S.R.Verma, (1970), A Textbook of Cytology, Jayaprakashnath & Co., Education Publisher, Meerut.
3. S.C.Rastogi, (1988), Cell biology, Tata Mc Graw Hill Publishing Co., New Delhi

SEMESTER - V
PAPER - X
IMMUNOLOGY

Subject Code: **Contact hours: 5 / week**

Contact hours: 60 / semester

Objectives :

- ❖ To enable the students to understand the basic concepts of defense mechanism.
- ❖ To expose the students into the field of medicine with powerful preventive, therapeutic and diagnostic tools.

Unit I

15hrs

History and scope of Immunology – Types of Immunity - Innate and Acquired Immunity. Innate – Physical and Mechanical factors, Biochemical, Cellular Genetic factors and other factors. Acquired Immunity – Active & Passive Immunity – Natural and Artificial Immunity.

Unit – II

10hrs

Antigen –Epitopes & Paratopes, Chemical nature of Antigen, Cross Reactive Antigen, Heterophil Antigen. Immunoglobulin G,A,M,D&E – Structure and Functions

Unit – III

15hrs

Lymphoid organs – Primary (Thymus, Bone Marrow and Bursa of Fabricius). Secondary (Spleen, Lymph node, Tonsil and Payer’s patches) Cells of the Immune System – T cells and its sub populations, B cells, Immune Responses- Cell mediated Immunity (CMI) and Antibody Mediated Immunity (AMI)

Unit – IV

10hrs

Major Histocompatibility Complexes – MHC restriction Phenomenon, MHC antigen, Human leucocyte Antigen (HLA) and functions.

Transplantation Immunology – Graft Rejection.

Hypersensitivity reactions – Types : I, II, III, IV, & V.

Unit – V**10hrs**

Tumour Immunology- Properties, Causes, Tumour antigens, Factors, Immune responses and Immunotherapy. Autoimmune Diseases – (Haemolytic anemia, Myesthema gravis, Lupus erythema) Causes, Pathogenesis, and Classification of Autoimmune diseases.

Text Book:

Dr.N.Arumugam et al., (2013) – Text book of Immunology, Saras Publication.

Reference Books :

1. Kuby ., (1992), Immunology, IV Ed., - W.H. Freeman and company.
2. Evan M.Roitt., (1988), Essentials Immunology- VI Ed., ELBS imprint.

SEMESTER - V
PAPER - XI
MOLECULAR BIOLOGY

Subject Code: **Contact hours: 5 / week**

Contact hours: 60 / semester

Unit I:

Identification of the Genetic materials- Evidences for DNA as the Genetic material – Transformation, Hershey & Chase Experiment, Bacterial Conjugation, Transduction, Evidences for RNA as the Genetic material eg. Tobacco Mosaic Virus (TMV).

Unit II:

Chemical nature of genetic materials – DNA – Watson & Crick’s model of DNA, Nucleotides, equivalence rule, Polymorphism of DNA helix – A-DNA,

B-DNA, C-DNA, Z-DNA – Molecular structure and types of RNA.

Unit III:

DNA replication, Types, Evidences for Semiconservative DNA Replication – M.Meselson& F.W.Stahl’s Experiment, J.H.Taylor & P.Woods Experiment – Semidiscontinuous DNA Replication - Unidirectional & Bidirectional DNA Replication. Enzymology of DNA Metabolism.

Unit IV:

Genetic Code – basis of Cryptoanalysis, Characteristics of Genetic code, Wobble hypothesis – Protein synthesis - Transcription, Translation, Post Translational processing (brief account). Differences between Prokaryotic & Eukaryotic Protein Synthesis.

Unit V:

Mutation - Classification, Molecular mechanism - Addition, Deletion, Substitution, Biochemical mutation – Neurospora, Man – detection of mutation – CIB technique. Control of gene expression – Lac Operon.

Text Book:

1.P.S.Verma & V.K.Agarwal. (2009), Molecular biology, S.Chand & Co.,

Reference Book:

1. H.D.Kumar ., (2005), Molecular Biology, S.N.Printers, New Delhi.
2. G.P.Jeyanthi., (2009), Molecular Biology, MJP Publishers, Chennai
3. S.C.Rastogi, (2006), Molecular Biology, CBS Publishers, New Delhi.

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SEMESTER - V

PAPER – VII

PRACTICAL - III

**BIOCHEMISTRY, CELL BIOLOGY, IMMUNOLOGY &
MOLECULAR BIOLOGY**

Subject Code:

Contact hours: 5 / week

Contact hours: 60 / semester

Biochemistry

- Enzyme Activity: Effect of temperature on Salivary Amylase activity. Q10 analysis.
- Qualitative tests for Protein, Carbohydrate and Lipid.
- Amino acid separation using chromatographic method - Paper Chromatography. (Demonstration only)
- Instrumentation – p^H meter, Colori meter, PAGE electrophoresis

Cell biology:

- Identification of mitotic stages in Onion root tip
- Identification of meiotic stages in Tredescantia
- Preparation of Human blood smear
- Preparation of Giant Chromosomes in Chironomus larvae (Demonstration only)

Spotters / slides :

- E.coli, Golgi bodies, Endoplasmic Reticulum, Nucleus - Models, Mitochondria and Chromosome

Immunology

1. Histology of lymphoid organs - Observation and study of prepared micro slides.

- Bone marrow.
- Bursa Fabricious
- Thymus.
- Lymph Node.
- Spleen.

2. Immunoglobulin Types - IgG, IgA and IgM.

Molecular Biology:

- Watson & Crick model of DNA - Model.
- DNA replication - Semi conservative Replication – Model
- Types of RNA – Models.
- Protein synthesis – Model

SEMESTER - V
PAPER - V
Elective III - MICROBIOLOGY

Subject Code:

Contact hours: 3 / week

Contact hours: 36/ week

Unit I

10hrs

Introduction – History and scope of microbiology.

Bacteria – Ultra structure of Bacteria. Virus - Life Cycle.

Bacterial culture – Batch Culture, Plate culture and Differential culture.

Bacterial growth - Growth Rate, Growth Curve & Culture Media.

Unit – II

10hrs

Food Microbiology : Food spoilage (Meat, Milk, egg, Fruits and Vegetable)

Food Poisoning – Food intoxication (Botulism) & Food infection (*salmonellosis*)

Food Preservation – Pickling, Salting, Canning, Pasteurization & Refrigeration

Unit – III

6hrs

Agricultural and environmental microbiology: Biofertilizer – *Rhizobium*,

Biopesticide – *Bacillus thuringiensis*, Biodegradation – *Pseudomonas*.

Unit – IV

Industrial Microbiology

4hrs

Fermentation Technology - Stages of Fermentation

Production of Antibiotics – Commercial Production of Pencillin.

Unit – V

6hrs

Medical Microbiology

Bacterial disease – Tuberculosis and Gonorrhoea.

Virus Disease – AIDS and Hepatitis – B.

Fungal diseases - Mycosis

Text Book:

1. N.Arumugam et al., (2011), Microbiology, Saras Publication

Reference Books :

1. Dr.R.C.Dubey .Dr.D.K.Maheswari, (2010), A Text book of Microbiology, S.Chand & CO
Ramnager, New Delhi.
2. Samuel Baron , Medical microbiology, II Ed., Wesley publishing company, California.

SEMESTER VI
PAPER -XIII
ANIMAL PHYSIOLOGY

Subject Code:

Contact Hours: 5 / week

Contact Hours: 60/ semester

Objectives :

- ❖ To make the students to understand the Fundamentals of Physiology.
- ❖ To provide the knowledge of Mechanism of actions of Structural units of all organs.
- ❖ To know the communication of all Animals with their Environment through sense organs.

Unit – I

10hrs

Historical background:

Nutrition, Food, Feeding and Digestion, Role of Enzymes in digestion,

Absorption

Unit – II

Respiration:

10hrs

Respiration – Respiratory Organs, Respiratory Pigments – Types and Significance, Transport of Respiratory Gases, RQ.

Circulation - Blood & Blood Constituents, Blood Coagulation & Haemodynamics

Heart : Structure of human heart, ECG, Origin and conduction of Heart beat

Unit – III

15hrs

Excretion:

Types of Nitrogenous Wastes - Ammonotelism, Ureotelism and Uricotelism.

Structure of Nephron, Formation of Urine.

Osmoregulation - Osmoregulation in Freshwater, Marine, Estuary and Terrestrial animals.

Thermoregulation

Unit – IV**15 hrs**

Nervous co-ordination:

Structure of Neuron, Types of Neurons.

Nerve impulse – Conduction of Nerve impulse, Synaptic Transmission, Properties of Nerve Impulse, Neuromuscular junction and Reflex action,

Muscle: Types of Muscle, Ultra structure of Myofibril, Muscle Proteins.

Physical and Chemical properties, Mechanism of Muscle Contraction

Unit V**10hrs**

Receptors:

Photoreceptor, Mechanoreceptor, Chemoreceptor and Thermo receptor.

Endocrine Integration:

Pituitary, Thyroid, Parathyroid, Adrenal and Sex glands.

Endocrine control on Reproductive cycle – Pregnancy – Development and functions of Mammary glands.

Text book:

1. Dr.N.Arumugam., (2010) ., Animal Physiology, Saras Publication

Reference Books :

1. William .S.Hoar, General and Comparative Physiology Prentice - Hall of India (private) Ltd, New Delhi.
2. C.Ladd. Prosser, Frank A. Brown, Comparative Animal Physiology , II Ed., W.B. Saunders company, London.

SEMESTER - VI
PAPER -XIV
BIOTECHNOLOGY

Subject Code:

Contact hours: 5 / week

Contact hours: 60 / week

Unit I

15 hrs

Biotechnology an over view: Scope, trends and current scenario of Biotechnology in India, Tools of Gene Cloning: Restriction Endonucleases, DNA Ligases, Cloning Vectors: Plasmid, Cosmid, Expression and Shuttle vector.

Unit – II

15hrs

Recombinant DNA Technology & Human Health – Human Growth Hormone, interferon, Interleukins, Tissue Plasminogen Activator, Commercial Production of Insulin, DNA Finger Printing and its use in Forensic Science, Intellectual Property Rights and Patent.

Unit – III

10 hrs

Animal Tissue Culture – Cell Culture Techniques, Monoclonal Antibodies – Production and Applications. Human Genome Project,

Unit – IV

10 hrs

Transgenics – Gene Transfer Techniques – Microinjection and Electroporation. Embryonic Stem Cell Technology, Transgenic Animals – Fish, Mice, Sheep and Cattle

Unit – V

10hrs

Environmental Biotechnology: Biodegradation – Super bug.

Biological Waste Treatment – Sewage treatment, Biomining & Bioreactors (glucose bioreactor), Biochips – Principle and use.

Text Book:

V.Kumaresan, (1994), Biotechnology VI Ed., - Himalaya publishing House.

Reference Books :

1.R.C. Dubey, (1993), A Text book of Biotechnology. III Ed., S.Chand & company Ltd.

1. H.K.Das, (2004), Text book of biotechnology III Ed., Wiley India (P) Ltd.

SEMESTER - VI
PAPER -XV
ENVIRONMENTAL BIOLOGY AND BIODIVERSITY

Subject Code:

Contact hours: 5 / week

Contact hours: 60 / week

Unit – I

Introduction:Subdivisions of ecology

Abiotic factors: Water, Type of water, Hydrologic cycle – Classification of Animals on the basis of Water requirement – Thermal stratification – Water Problem in Aquatic habitat, water problem in terrestrial habitat.

Temperature – Range of Temperature – Terrestrial & Aquatic habitat, Adaptations for temperature.

Light – Spectral Composition, Biological effects of Light.

Unit – II

Animal Relationship – Neutralism, Symbiosis : Commensalism & Mutualism, Antagonism : Antibiosis, Parasitism, Predation and Competition.

Unit – III

Community Ecology – Types of Community, Characteristics of a Community – Community Diversity, Community Dominance, Stratification, Community periodicity – Ecotone and Edge effect, Ecological niche, Concepts of Community and Ecological Succession.

Unit IV:

Fresh water Habitat – Types of freshwater, Lentic – Pond – Zonation, Pond flora and fauna, Lotic – river – Characteristics – Zonation, Adaptation to Lotic Habitat. Marine, Estuary & Terrestrial Habitat : Characteristics of Marine Habitat, Pelagic Communities, Pelagic Adaptations. Benthic region – Littoral zone – Intertidal rocky shore – Zonations & Adaptations. Intertidal Sandy Shore – Zonations & Adaptations Intertidal Muddy Shore – Adaptations Estuarine ecology – Characteristics, Biota of Estuaries, Estuarine adaptations. Terrestrial habitat – Forest biomes – Coniferous forest, Tropical Rain forest and Deciduous forest – Forest adaptations.

Unit V:

Biodiversity – Genetic diversity, Species diversity, National biodiversity, Measurement of biodiversity – Alpha, Beta, Gamma diversity, IUCN Red data Books – IUCN categories. Endangered, Vulnerable, Rare and Threatened. Biosphere Reserves – Agasthiayar Malai Biosphere Reserve, Gulf of Mannar Biosphere Reserve, Nilgiri Biosphere Reserve, Project Tiger, Crocodile breeding project.

Text book:

- N. Arumugam, (2001), Concepts of Ecology, Saras Publication.

Reference Books:

- P.S.Verma & V.K.Agarwal, (2009), Environmental Biology, S.Chand & Company Ltd., New Delhi
- Kumar Asija, (2002), Biodiversity, Principles & Conservation, Agro.bios.Jodhapur.
- P.D.Sharma, (2010), Ecology & Environment, Rastogi Publications, Meerut.
- P.S.Verma & Agarwal, (1985), Animal Ecology – Environmental Biology, S.Chand & Company Ltd., N.Delhi

SEMESTER –VI

Paper – XVI EVOLUTION

Sub code :

Contact hours: 5 / week

Contact hours: 60 / semester

Unit –I

15hrs

Evidences : Morphological – Homologus, Analogus and Vestigial Structures. Embryological, Serological & Biochemical Evidences for Evolution.

Theories: Lamarckism and Neolamarckism, Darwinism and Neodarwinism, Modern synthetic theory

Unit - II

10hrs

Fossils: Types, Methods of Fossilization- Methods of dating the Fossils, Geological time scale.

Sources of Variation: Mutation, Genetic Recombination, Genetic drift and Hybridization

Unit – III

15hrs

Microevolution: Elemental Forces and Mechanism

Hardy –Weinberg law: Factors that upset the Hardy – Weinberg Equilibrium

Result of Microevolution: Adaptive Coloration, Mimicry and Coevolution

Unit – IV

10hrs

Macroevolution: Patterns: Divergent, Convergent and Parallel. Adaptive Radiation in Darwin's Finches

Speciation: Allopartic and Sympatric, Isolating Mechanism – Prezygotic and Postzygotic isolating mechanism.

Unit – V

10hrs

Horse Evolution: Trends, Fossil records, Orthogenesis.

Human Evolution: Fossil Records and future of Man.

Text Book:

1. Organic Evolution : N.Arumugam, (2005), Organic Evolution, Saras Publication.

Reference Books:

- 1.G.L.Stebbins, (1979), Process of Organic Evolution, Prentice Hall India, New Delhi.
2. Veer Bala Rastogi, (1983), Organic Evolution, Kadarnath & Ramnath Publication, New Delhi.
3. T.K.Renganathan, (1982), Evolution, C.M.S Printing Press, Palayamkottai.

SEMESTER –VI

PAPER - XVII

PRACTICAL – IV

**ANIMAL PHYSIOLOGY, BIOTECHNOLOGY, ENVIRONMENTAL
BIOLOGY AND EVOLUTION**

Sub code :

Contact hours: 5 / week

Contact hours: 60 / semester

Animal Physiology:

1. Estimation of Rate of Oxygen Consumption in a Fish.
2. Effect of temperature on Ciliary Activity of Fresh Water Mussel. (Demonstration only)
3. Estimation of Excretory products of Fish, Bird and Mammals and detection of Ammonia, Urea and Uric acid
4. Demonstration of Blood Pressure using Sphygmomanometer

Experimental set up:

1. Kymograph
2. Sphygmomanometer
3. Haemoglobinometer
4. Haemocytometer

Biotechnology: Demonstration only

1. Extraction of DNA.
2. Extraction of RNA
3. Agarose Gel Electrophoresis.
4. PAGE
5. Isolation of Plasmids

Spotters

Electrophoretic Apparatus, PCR, Biosensor, Biochip, Transgenic Sheep & Mice.

Environmental Biology:

1. Pond / River / Forest Ecosystem – Field visit and submission of report
2. Observation of animal association: Mutualism, Commensalism, Parasitism.
3. Analysis of Fresh Water Planktons

Spotters:

- Pond Ecosystem, Sea anemone, Balanus, Starfish, Nautilus, Physalia, Sea cucumber, Amphioxius, Neries, Aremicola, Ascolia.

Evolution:

- Homologous and Analogous organs, Vestigial Organs, Fossil, Geographical Time Scale, Evolutionary importance- Archeopteryx and Peripatus, Adaptive colouration – Leaf insect, Stick Insect, Chameleon, Variation – Finger print.

Semester VI

Elective - IV

BIO INFORMATICS

Sub Code :

Contact Hours : 3 / hours

Contact Hours : 36 / semester

Unit I

8 hrs

Basics of Bioinformatics – Aims, Tasks and Applications of bioinformatics.

Introduction to Internet, e.mail, World Wide Web (www).

Web Browser – Internet Explorer

Unit II:

8 hrs

Biological databases – Nucleic Acid Databases – NCBI, EMBL, DDBJ & Gen Bank.

Protein Sequences Databases – PIR, SWISS – PROT & TrEMBL

Unit III:

8hrs

Genomics:

Genome, Genome Mapping, Human Genome Project.

Types of Genomics: Structural, Comparative and Functional genomics.

Proteomics: Structural and Functional Proteomics

Unit IV:

8hr

DNA Sequencing methods: Gilbert's Chemical degradation Process

Sanger's dideoxy ribonucleotide Synthetic Method

Automated DNA Sequencing technique

Unit -V:

4 hr

Gene Expression Analysis – DNA Microarray or DNA chip

Protein Expression analysis – X ray Crystallography

Text Book:

1.S.Ignacimuthu ., (2005), Basic Bioinformatics, III Ed., Narosa Publishing House Pvt. Ltd.

Reference Books:

1. Prakash S Lohar., (2009), Bioinformatics, I Ed., MJP Publishers.
2. T K Attwood & D J Parry Smith., (2008), Introduction to Bioinformatics, I Ed., Himalaya Publishing House.

Semester - VI

SBS (Skill Based Subject)

POULTRY

Sub code : **Contact hours: 2 / week**

Contact hours: 24 / Semester

Unit I 5 hrs

Introduction of Poultry Keeping – Choosing Commercial layers, Broilers – White Leghorn, Black Minorca, Australorp, Plymouth rock, Rhode Island and Ancona.

Unit II 5 hrs

Construction of Poultry House – Principle for the Construction of Poultry House. Deep Litter System components : advantages and disadvantages. Cage system – Cage birds – California cages, Management of Cage birds – advantages and disadvantages.

Unit III 5 hrs

Poultry Nutrition – Essential and Non essential food, Fibre contents, Vitamins and Minerals, Formulation of Supplementary Feed. Management of Chicks – Growers, Layers and Broilers, Summer and Winter management, Debeaking.

Unit IV: 5 hrs

Poultry products – Eggs – Nutritive Value of Eggs, Cleaning of Egg, Preservation Marketing. Processing of birds for Meat – Marketing, By products of Poultry- feathers, Poultry Manure.

Unit V: 4 hrs

Poultry Diseases and Prevention – Ranikhet diseases, Fowl pox, Coryza, Coccidiosis, Polyneuritis and Bird's Flu

Text Books:

Dr.N.Arumugam, Dr.S.Murugan, Dr.J.Johnson Rajeshwar and Dr.R.Ram Prabhu, (2005), Applied Zoology, Saras Publication, Nagerkovil.

Reference Books:

1. Biester., Diseases of Poultry, Oxford & IBH
2. M.R.Gnanamani, Poultry Keeping
3. Ravindranathan, K.R.(2005), A text book of Economic Zoology , Dominant Publishers and Distributors, Delhi.