MEENAKSHI COLLEGE FOR WOMEN [AUTONOMOUS] CH-24
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY
SYLLABUS WITH NEW SUBJECT CODE

Class: I B.Sc. **Semester-I**
Sub:Code: IMZ01a **No. of Credit: 5**

INVERTEBRATA - I

1. Functional morphology of the types included with special emphasis on the adaptations to their modes of life and environment.

2. General characteristics and classification of all phyla up to class with specified examples, emphasizing their bio-diversity and economic importance.

Unit –I

Introduction to Animal kingdom- Principles of Taxonomy-Binomial nomenclature - International code of zoological nomenclature.

PROTOZOA - General characteristics, classification up to class with mentioned examples - Rhizopoda -*Elphidium* (type study), Mastigophora – Euglena& *Noctiluca*, Sporozoa- *Monocystis* [type study], Ciliophora - *Paramecium* [type study] & *Vorticella.*
General topic-Nutrition and Locomotion in Protozoa.

Unit -II

PORIFERA - General characteristics and classification up to class;
Calcarea - *Leucosolenia* [Type study];
Hexactinellida - *Hyalonema* & *Euplectella;*
Demospongia-*Spongilla* & *Euspongia.*
General topic- Canal system and larval forms in sponges; Economic importance of sponges.

Unit-III

COELENTERATA - General characters and classification up to class;
Hydrozoa – Obelia (Type study) & Physalia; Scyphozoa – Aurelia;
Anthozoa – Sea anemone (Type study).
General topic- Corals and coral reefs; polymorphism.

Unit -IV

HELMINTHES General characters and classification up to class;
Turbellaria-Planaria& *Temnocephala;*
Trematoda-Liver Fluke; Cestoda- *Taenia solium* (Type study).
Nematoda-*Ascaris lumbricoides* (Type study).
General topic-Parasitic adaptations of the above mentioned examples.

Unit-V

ANNELIDA General Characters and classification up to class;
Chaetopoda-*Nereis* (type study), *Chaetopterus, Tomopteris& Arenicola;*Hirudinea-*Leech.*
Vermiculture. Minor Phylum- *Chaetognatha.*

TEXT BOOKS

Kotpal, R.L., 1988-1992. (5 Series- Protozoa, Porifera, Coelenterata, Helminthes& Annelida), Rastogi Publications, Meerut.

Ayyer, E.K., and Anantakrishnan, T.N., 1992. Manual of Zoology Vol.I Part-I. Viswanathan, S., (Printers and Publishers), Pvt., Ltd. Madras, 991 pp.

REFERENCE BOOKS

Jordan, E.L. andVerma, P.S., 1993. Invertebrate Zoology, 12th Edition, S.Chand and Co.,Ram Nagar, Delhi, 1050 pp.

Parker and Haswell, 1964. Text Book of Zoology Volume-1 A.E.T.B.S. Publishers and distributors, New Delhi, 814 pp.

Ismail, S.A. 1997. Vermicology. The biology of Earthworm. Orient Longman, India, 92pp.

MEENAKSHI COLLEGE FOR WOMEN [AUTONOMOUS] CH-24
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

Class: I B.Sc. **Semester-I**
Sub : Code: IMZ02a **No. of Credit: 5**

INVERTEBRATA - II

1. Functional morphology of the types included with special emphasis on the adaptations to their modes of life and environment.
2. General characters and classification of all phyla up to class with specified examples emphasizing their biodiversity.

Unit –I

ARTHROPODA

General characters and classification up to class with specified examples – *Sacculina* on crab, *Cyclops, Lepas, Balanus,* centipede, millipede;
Type study – Prawn, Grasshopper & Scorpion.

Unit –II

ARTHROPODA-GENERAL TOPICS

Useful and harmful insects, social life in insects, crustacean larvae and their significance, *Peripatus* and its affinities.

Unit- III

MOLLUSCA

General characters and classification up to class with specified examples – *Neopilina, Dentalium, Aplysia, Patella, Haliotis, Doris, Ostrea, Mytilus, Octopus, Nautilus, Teredo.*

AMPHINEURA AND GASTROPODA

Type study – *Chiton & Pila globosa.*

Unit-IV

PELECYPODA AND CEPHALOPODA

Type study – *Freshwater mussel & Sepia;*Economic importance of mollusca and pearl culture.

Unit-V

ECHINODERMATA

General characters and classification up to class; Type study: Sea star, sea urchin & Sea cucumber; Echinoderm larvae and their significance.

TEXT BOOKS

Ayyer, E.K., and Ananthakrishnan, T.N., 1992. –Manual of Zoology Vol.1 Part II. Viswanathan, S. (Printers and Publishers), Pvt., Ltd. Madras, 991 pp.

Kotpal.,R.L., 1998 – 1992. (3 series- Arthropoda, Mollusca, Echinodermata.) Rastogi Publications, Meerut.

REFERENCE BOOKS

Jordan,E.L., and Varma, P.S., 1993. Invertebrate Zoology, 12th Edition, S.Chand and Co. Ram Nagar, New Delhi, 1050pp.

Parker and Haswell, 1964. Text Book of Zoology Vol.I, A.E.T.B.S.publishers and distributors, New Delhi, 874pp.

MEENAKSHI COLLEGE FOR WOMEN [AUTONOMOUS] CH-24
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

Class: I BSc. **Semester-II**
Sub: code: 2MZ03a **No. of Credit: 5**

CHORDATA - I

Unit – I

GENERAL CLASSIFICATION OF CHORDATA

General characters and outline classification of phylum Chordata; **PROCHORDATA**-Hemichordata- general Characters and affinities – *Balanoglossus.* Urochordata- general Characters, systematic position and affinities - *Ascidian*. Cephalochordates- general Characters, systematic position and affinities, Type study – *Amphioxus.*

Unit – II

AGNATHA - General characters and affinities; Type study – *Petromyzon.*

Unit-III

PISCES-General characters and classification up to class with specified examples-*Mullet, Hippocampus, Clarius, Arius;* Type study – *Shark.*

Unit – IV

PISCES -GENERAL TOPICS

Accessory respiratory organs, Migration of Fishes, Economic importance of fishes.

Unit – V

AMPHIBIA - General Characters, Origin of amphibia, Parental care, Type study-Frog.

TEXT BOOKS

Ayyer, E.K., and Ananthakrishnan, T.N., 1992. Manual of Zoology Vol-II (Chordata), Viswanathan, S. (Printers and Publishers) Pvt., Ltd. Madras, 991pp.
Kotpal, R.L., Modern Text Book of Zoology, Vertebrates, Rastogi Publication, Meerut.

REFERENCE BOOKS

Jordan, E.L., and.Verma, P.S., 1995. Chordate zoology and Elements of Animal. Physiology, 10th Edition, S.Chand and Co.Ltd. Ramnagar, New Delhi, 1050pp.

Nigam, H., 1983. Zoology of Chordates, Vishal Publications, Jalandhar, 942pp. Newman, H.H., 1981. The Phylum Chordates, Satish book Enterprise, Agra, 477pp.

MEENAKSHI COLLEGE FOR WOMEN [AUTONOMOUS] CH-24
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

Class-I BSc. **Semester-II**
Sub: code: 2MZ04a **No. of Credit: 5**

CHORDATA - II

Unit –I

REPTILIA

General Characters of class with specified examples emphasizing their Biodiversity- *Chelonemydas, Testudoelegans, Sphenodon, Hemidactylus, Chameleon, Draco and Crocodiles*.

Type study – Calotes [Ext. morphology, endoskeleton, Digestive system, Respiratory system, Circulatory system, Nervous System, Urinogenital system].

Unit – II

REPTILIA-GENERAL TOPICS

Origin of Reptiles; Extinct Reptiles;
Poisonous and Non Poisonous snakes of India;
Poison apparatus and biting mechanisms – Snake venom and First aid treatment of Snakebite; Systematic Position of *Sphenodon*

Unit– III

AVES

General characters of class with specified examples; House sparrow, Crow, Vultures, Owls, Peacock and Woodpecker.

Type study-Pigeon [Ext. morphology, histology, digestive system, respiratory system, circulatory system, nervous system, urinogenital system].

Unit– IV

AVES-GENERAL TOPICS

Origin of Birds, Characters of *Archaeopteryx;* Account of Ratitae; Flight adaptations; Bird migration.

Unit –V

MAMMALS

General characters of class with specified examples; *Bat, Sloth, Tiger, Whale, Gorilla, Hippopotamus*. Type study-Rabbit [Ext. morphology, histology, digestive system, respiratory system, circulatory system,nervous system, reproductive system and excretory system].

GENERAL TOPICS- Dentition in mammals; Egg laying Mammals and Marsupials.

TEXT BOOKS

Ayyer, E.K., and Ananathakrishnan, T.N., 1992.Manual of Zoology-II (chordata), Viswanathan, S., (Printers and Publishers) Pvt; Ltd. Madras, 891pp.

Kotpal, R.L., Modern Text Book of Zoology, vertebrates, Rastogi publications, Meerut.

REFERENCE BOOKS

Jordan, E.L., and Verma P.S., 1995. Chordate Zoology and elements of Animal physiology, 10th Edition, S.Chand and Co., Ltd., Ramnagar,New Delhi, 115 pp.

Nigam, H.C., 1983. Zoology of Chordates, Vishal Publications-Jalandhar, 942 pp.

Newman, H.H., 1981. The Phylum Chordate, Satish book Enterprise Agra, 477 pp.

MEENAKSHI COLLEGE FOR WOMEN [AUTONOMOUS] CH-24
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

MAIN PRACTICAL-1

Class - I B.Sc. **Semester-II**
Sub: code: 2MZP1 **No. of Credit: 5**

1. Study of museum specimens and slides relevant to the type studied in Theory.

2. Dissection of digestive, reproductive and nervous system of cockroach.

3. Dissection of Digestive, Arterial, X Cranial nerve and urinogenital system of Frog

A. **Mounting**
1. Body setae of Earthworm.
2. Mouth parts of mosquito.
3. Appendages of Prawn.
4. Placoid scales of shark.
5. Brain of Frog.

B. Identification of prepared skeletal structures of shark, Frog, Calotes, and Appendicular skeleton of Pigeon and Rabbit.

C. Demonstration of Arterial, Venous and Urinogenital system of Rat.

MEENAKSHI COLLEGE FOR WOMEN [AUTONOMOUS] CH-24
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

DEVELOPMENTAL BIOLOGY

Class: II B.Sc. **Semester: III**
Sub: code: 3MZ05b **No. of Credit: 5**

Unit – I

GAMETOGENESIS

Egg membranes, organization of the egg and yolk, polarity- origin Polarity, types of egg.

FERTILIZATION

Definition, significance, external and internal fertilization, monospermy and polyspermy, egg activation, amphimixis, physiological changes in fertilization.

Unit-II

CLEAVAGE

Definition, salient features, blastula- types of blastula, laws of cleavage, types of cleavage, influence of yolk, cleavage in frog, chick and mammal.

Unit-III

GASTRULATION

Definition, salient features, gastrula, molecular changes during gastrulation, exogastrulation, morphogenetic movements, gastrulation in frog, chick and mammal.

Unit – IV

ORGANOGENESIS

Development of brain, eye, ear and heart in frog, foetal membranes in mammal, placenta - definition - significance- different types of placenta.

Unit-V

EXPERIMENTAL EMBRYOLOGY

Menstrual cycle, menopause, induced ovulation, artificial fertilization, birth control, infertility, test tube babies, nuclear transplantation. Organizers - primary and secondary - theories.

TEXT BOOKS

Verma, P.S., Agarwal V.K., and Tyagi, 1995 Chordate embryology, S.Chand & Co., New Delhi, 110055.

Arumugam, N., 1996.'Textbook of Embryology' Saras Publication, Kanyakumari District.

REFERENCE BOOKS

Nelson, O.E., 1953. Comparative Embryology of the vertebrates, The Blackston, Co., Inc: New York.

Balinsky, B.I., 1981. Introduction to Embryology, Saundas College Pub.

Berill, N.J., 1986. Developmental Biology .Tata Mcgraw Hill, Pub; Co., Ltd.

MEENAKSHI COLLEGE FOR WOMEN [AUTONOMOUS] CH-24
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

ENVIRONMENTAL BIOLOGY AND BIOTECHNOLOGY

Class: II B.Sc. **Semester: III**
Sub. Code: 3MZ06b **No. of Credit: 5**

Unit- I

INTRODUCTION

Definition, Derivation of the term, Historical background, Relation to other Sciences. Sub divisions and branches of Ecology. Growth of Animal Ecology in India.

Unit-II

ABIOTIC ENVIRONMENTAL FACTOR

Limiting factors- Light, Temperature, Precipitation, Humidity, Wind, Soil and Water.

Unit-III

BIOTIC FACTOR

Animal relationship; Population ecology -Population density, Population growth, Natality, Mortality, Community ecology, Ecological succession.

Unit- IV

HABITAT ECOLOGY

Marine habitat- General characters, Zonation, Pelagic adaptations, Fauna, Deep sea adaptations, Fauna. Fresh water habitat- General characters, Lentic and Lotic habitat-lake and river. Terrestrial habitat general characters. Biome- definition Tundra, Cave.

Unit-V

BIOREMEDIATION-ENVIRONMENTAL BIOTECHNOLOGY

Definition; Bioremediation- Need and scope.

APPLICATIONS OF BIOREMEDIATION

In situ bioremediation, intrinsic bioremediation, engineered In situ bioremediation.Ex situ bioremediation- solid-phase treatment, composting, bioremediation of hydrocarbons, bioremediation of xenobiotics, Bioremediation of industrial wastes, dyes and heavy metals.

TEXT BOOKS

Veer Bala Rastogi, Jayaraj, M.S., Animal Ecology and Distribution of Animals, Kedar nath Ram nath Publications, College Road, Meerut, 250002.

Dubey, R.C., A Textbook of Biotechnology, S.Chand & Co., Ram nagar, New Delhi-110055.

REFERENCE BOOK

Sharma, P.D., Ecology and Environment, Rastogi Publications, Shivaji Road,

Meerut. 250002.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CH-24
DEPARTMENT OFADVANCED ZOOLOGY AND BIOTECNOLOGY

CELL AND MOLECULAR BIOLOGY

Class: II B.Sc. **Semester: IV**

Sub: code: 4MZ07a **No. of Credit: 5**

Unit -I

METHODS FOR THE STUDY OF CELLS

Microscopy- Principle of light (bright field and phase) and electron (transmission and scanning) microscopes, Ocular and Stage micrometer, Camera Lucida. Isolation of cellular component- homogenization, fractionation, centrifugation. Fundamentals of fixation and staining methods-vital staining.

Unit -II

PLASMA MEMBRANE: Structure, Chemical composition and function. **ENDOPLASMIC RETICULUM**: Morphology, Structure, types and functions. **GOLGI COMPLEX**: Morphology, Chemical composition, Origin and functions. **LYSOSOME**: Structure and forms, Origin and functions. **MICROBODIES**- Peroxisomes and glyoxysomes.

Unit -III

MITOCHONDRIA AND RIBOSOMES

Mitochondria: Structure, chemical composition and functions, respiratory chain, Krebs's cycle and ATP production. Ribosomes: Structure, Chemical Composition and functions. Protein synthesis: Mechanism, role of RNA in protein synthesis.

Unit-IV

CHROMOSOMES: Structure and functions, giant chromosomes. **NUCLEIC ACID**-molecular structure of DNA and RNA, Types of RNA,DNA replication. **NUCLEUS** and Nucleolus. Centrioles: Structure and function.

Unit-V

CELL DIVISION AND CANCER CELLS

Cell cycle - Mitosis and Meiosis. Characteristics of cancer cells, Carcinogens.

TEXT BOOK

Verma, P.S., and Agarwal, V.K., 1995. Cell and molecular Biology, 8th edition,S.Chand and Co., New Delhi, 110055, 567 pp.

REFERENCE BOOKS

De Robertis, E.D.P., and De Robertis, E.M.F., 1988. Cell and molecular Biology, 8th edition, International Edition, Hong Kong.

Powar, C.B., 1989. Essential of Cytology, Himalaya Publishing House, Bombay - 400 004.363 pp.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

BIOTECHNOLOGY & BIOETHICS

Class: II BSc. **Semester: IV**
Sub: code: 4MZ08 **No. of Credit: 5**

UNIT-I

INTRODUCTION TO BIOTECHNOLOGY

Definitions and landmarks in the history of Biotechnology. Application of Biotechnology in agriculture, food, pharmaceutical industry and fermentation processes. Centers, activities and achievements of Biotechnology in India.

UNIT-II

CONCEPT OF GENE – ENZYMES USED IN GENE TRASFER MECHANISM

DNA organization, Enzymes- Nuclease, Restriction enzymes, Polymerases, and Ligases, Structure of *E.coli*, Bacterial conjugation, transduction and transformation. Structure of Bacteriophage, Lytic and Lysogenic cycles.

UNIT-III

VECTORS – PLASMID AND BACTERIOPHAGE

Vectors- Types (Plasmids PBR 322 & PBR 327), Phageλ, M13 Cosmid insertion vectors, replacement vector, shuttle vector and high expression vector.

UNIT- IV

GENE TRANSFER MECHANISM – GENE CLONING, GENE EXPRESSION, TISSUE CULTURE TECHNIQUE

Gene cloning in *E. coli.* DNA isolation, insertion of DNA – use of linkers and adapters, Transformation, uptake of DNA by host cell. Selection of clones and identification of recombinants. Animal tissue culture.

UNIT-V

BIOETHICAL ISSUES

Hippocratic Oath. Bioethical issues in Human cloning and Female infanticide. Environmental ethics.

TEXT BOOKS

Dubey, R.C., A text book of Biotechnology- S. Chand & Co., New Delhi.
Zubei, an Introduction to Biotechnology –1996.

REFERENCE BOOKS

Daryl. R.J.Macer., Ph.D, Eubris- Shaping genes, Ethics Institute.
AIBA (All India Bioethical Association Newslink).
Principles of Biomedical Ethics, Oxford University Press.
Trevan M.D.S. Boffer, Goulding, K.H. and Stansbury, P., Biotechnology the biological principles, Tata Mc Graw publication Ltd. New Delhi.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

ECONOMIC ZOOLOGY

Class: II B.Sc. **Semester: IV**
Sub: code: 4MZ09a **No. of Credit: 5**

UNIT-I

PRASITOLOGY

An elementary knowledge of the parasites of man with reference to their structure, life history, diseases caused and prevention.- *Entamoeba histolytica -Trypanosoma gambiense- Plasmodium vivax- Schistosoma mansoni - Taenia saginata - Wuchereria bancrofti.*

UNIT-II

PEST MANAGEMENT
INSECT PESTS OF SOME CROPS OF ECONOMIC IMPORTANCE
Pests of Sugarcane.
Sugarcane leaf hopper – *Pyrilla perpusilla*
Sugarcane shoots borer – *Chilo infuscatellus snellen*.
Pests of paddy.
Rice bug – *Leptocorisa varicornis.* Walker-*Tryporyza incertulas*
Pest of coconut- Coconut bug- *Oryctes rhinoceros*

IPM [INTEGRATED PEST MANAGEMENT]
Natural Control- Climatic Factors Topographic factors, Natural enemies, Practical application of natural control.
Applied Control- Mechanical Control, Physical Control.
Legal Control: Quarantine and inspection law, Insecticide law. Chemical Control- Insecticides; Qualities of insecticide, Formulations of insecticides – Dust, Granules, wettable powder and solutions. Insect attractants, Insect repellents. Biological control, Hormonal control.

UNIT – III

APICULTURE
Honey bee, Species of Honey bee, Social organization of honey bee, Life History of Apis indica. Selection of bees for apiculture, Methods of bee keeping- Indigenous method. Appliances for modern method, Advantages of modern method. Products of bee keeping and Economic importance of honey.

UNIT – IV

LAC CULTURELAC INSECT- Life History of *Tachardia lacca,* Host plant, Cultivation of Lac, Incubation period, Harvesting of Lac, Processing of the Lac. Composition and properties sof Lac, Properties of Lac, Enemies of Lac cultivation, Precautions. Lac Industry in India.

UNIT – V

SERICULTURE
Silk moth: Species, the mulberry silk worm, Life history of *Bombyx mori*.
SERICULTURE INDUSTRY- Mulberry plantation, Rearing of silk worm-Grainage management, Emergence of moth, Fertilization egg laying, Hatching, Commercial rearing,

Spinning of cocoons. Post cocoon processing -Stifling, Realing & Spinning. Diseases-Maggot disease, Pebrine, Flacherie, Green muscardine. Economic importance of silk, recent efforts in Sericulture in India.

TEXT BOOK

Shukla, G.S., & Upadhyay, V.B., Economic zoology, Rastogi publication, Shivaji Road, Meerut. 250002, India**.**

REFERENCE BOOKS

Jawaid Ahsan & Subhas, A hand book of economic zoology,
S.Chand & Co.,New Delhi 110055
Ayyar, E .K and Ananthakrishnan, T.N., Manual of Zoology, Vol.I, Invertebrata.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

MAIN PRACTICAL: 2

Class: II B.Sc. **Semester: VI**
Sub: code: 4MZP2 **No. of Credit: 5**

A. DEVELOPMENTAL BIOLOGY

Study of the following prepared slides, museum specimen, and materials.

1. Sections of Testis & Ovary showing the maturation stages of gametes (Mammalian)
2. Study of egg type, Frog egg & Hen egg.
3. Slides of different stages of chick embryo 24, 72 Hrs.
4. Placenta of sheep.

B. ENVIRONMENTAL BIOLOGY & ENVIRONMENTAL BIOTECHNOLOGY

1. Estimation of dissolved oxygen. (Winkler's method)
2. Estimation of Salinity.
3. Estimation of Carbonates & Bicarbonates.

INSTRUMENTS [SPOTTERS]

4. Rain gauge, Maximum minimum Thermometer, Hygrometer, Photometer, Barometer, pH meter.
5. Plankton study – Freshwater and Marine water planktons.

C. CELL BIOLOGY

1. Camera Lucida, stage, Ocular micrometer & Centrifuge.
2. Counting of RBC & WBC using haemocytometer.
3. Blood Smear preparation – Differential Count of WBC.
4. Mounting of buccal epithelium.
5. Study of mitotic division using root tips.

D. ECONOMIC ZOOLOGY

1. Prepared slide of
   a. *Entamoeba histolytica.*
   b. Prepared specimen of *Schistosoma.*
2. Rhinocerous beetle
3. Queen bee, Drone, Worker bee, (observation of Beehive)
   Importance of Honey.
4. Identification of Silkworm larva & Cocoon

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHN OLOGY

ANIMAL PHYSIOLOGY

Class: III B.Sc. **Semester V**
Sub: code: 5MZ10a **No. of Credit: 5**

Unit - I

NUTRITION AND METABOLISM

Types of nutrition, modes of food procurement in animals, digestion, absorption, assimilation in man. Metabolism-Energy production from carbohydrates, proteins and fats, Regulation of metabolism.

Unit – II

RESPIRATION

Oxygen procuring mechanism in animal - skin, gills, lungs, trachea, properties and functions of respiratory pigments, role of hemoglobin in the transport of respiratory gases in man, dissociation curves and their significance.

CIRCULATION

Types of hearts- Pulsating, Tubular, Chambered and Accessory. Blood- functions, general properties, composition, and coagulation - theories of blood clotting, pace makers, myogenic and neurogenic hearts & ECG.

Unit – III

REGULATORY MECHANISMS

Osmoionic regulation with reference to crabs and fishes, Hormonal control.

EXCRETION

Classification of animals based on excretory products, formulation of nitrogenous wastes in animals, structure of human kidney, mechanism of urine formation.

Unit – IV

NEUROMUSCULAR CO-ORDINATION

Muscles- Types of muscles, muscle contraction- Physical and Chemical changes, theories of muscle contraction.

COMPONENTS OF NERVOUS SYSTEM

Neuron, giant nerve fibre, nerve impulse propagation along a nerve fibre, synapse, reflex action.

Unit – V

RECEPTORS

Mammalian eye-structure, image formation, visual pigments, colour vision, binocular vision, phonoreceptors. Mammalian ear- structure and working mechanism, chemoreceptor and equilibrium receptor.

TEXT BOOK

Parameswaran, Ananthakrishnan T.N., & Ananthasubramaniam, Outlines of Animal Physiology, S.Viswanathan (Printers & Publishers) PVT. Ltd.,

REFENENCE BOOKS

Sambasivaiah, Kamalakara Rao & Augustine Chellappa - A Text Book of Animal physiology & Ecology- S.Chand & Co., New Delhi 110055.

Prosser C.L., Comparative Animal Physiology, Satish Book Enterprise, Agra 282003.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

IMMUNOLOGY & IMMUNOTECHNOLOGY

Class: III BSc **Semester: V**
Sub: Code: 5MZ11a **No. of Credit: 5**

Unit-I

BASIC CONCEPTS

History and Scope of Immunology. Immune response: Basic concepts- recognition of non-self and self- beneficial and harmful effects.

Autoimmune and immunodeficient diseases: definition, examples implicating importance of normal immune reactivity.

Antigens: Antigenicity, hapten, immunogen, antigenic determinants- definition and examples, classification of antigens; adjuvants-definition and examples.

Unit-II

ORGANISATION OF IMMUNE SYSTEM

External/First line of defence system: Type of components; Examples, distribution and functions; Innate immunity- importance and functional features

Internal/Second line of immune system: Primary and secondary lymphoid tissues/organs-definition, examples, anatomical location, structure (thymus, spleen, lymphnode) and functions.

Immune cells and molecules: types, structure/native, origin, distinction and functions; concepts of cell-mediated and humoral immunity.

Acquired immunity: Salient functional features; types (active and passive): definition and examples.

Unit-III

ANTIBODIES

Primary structure of antibody. Isotype, allotype, idiotype; definition and implication.

Classifications and functions (any one for each class).

Biosynthesis- Cellular events.

Unit-IV

MONOCLONAL ANTIBODIES

B- Cell clones monoclonal antibodies.

Production of monoclonal antibodies (hybridoma technology).

Production of human monoclonal antibodies (recombinant DNA technology).

Application of monoclonal antibodies in biology and medicine.

Unit-V

VACCINES AND IMMUNODIAGNOSTICS

Principles and strategies in vaccine development.

Interferons: Production and therapeutic applications

Pregnancy test: Detection of HCG

Principles and application of ELISA and RIA.

TEXT BOOKS

Dulsie Fatima & Arumugam- Immunology. SARAS Publication, Nagercoil.
Roit.J.M. et al (1994). Essentials of Immunology Blackwell Scientific Oxford, ISBN. 632pp.
Janus kuby- Immunology III edition (1997) W.H.Freeman and Co., New York.

REFERENCE BOOKS

J.W.Goding (1983) Monoclonal antibodies- Principles and practice. Academic press.
T.A. Springer (1985) Hybridoma Technology in the Biosciences and Medicine. Plenum press.
F.Brown, R.M. Chamock, R.A. Learner (1986) Vaccines 86. New approaches to immunization. Coldspring harbour Lab.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGYAND BIOTECHNOLOGY

GENETICS

Class: III BSc. **Semester- V**
Sub: code: 5MZ12a **No. of Credit: 5**

Unit-I

MENDELISM: Mendal's experiments, Backcross or Testcross, Phenotype and Genotype, Dihybridcross, Trihybrid and polyhybrid crosses, Mendel's laws; Incomplete dominance. **Interaction of genes**-Complementary factors, Supplementary factors, inhibitory and lethal factors. **Multiple alleles** – In Drosophila, coat colour in Rabbit and Blood group inheritance in man.

Unit- II

LINKAGE: Definition, lingage in Drosophila- Morgan's experiments,theories of linkage, factors affecting linkage. **CROSSING OVER** –Definition,types, mechanism, Cytological evidence for crossing over,significance of crossing over factors affecting crossing over.Mapping of Chromosomes, interference and coincidence. Sex-linked inheritance in Drosophila and man. Sex determination. Cytoplasmic inheritance – Definition, kappa particles in paramecium,shell coiling in snail, sterility in plants,plastid inheritance in plants, Carbon dioxide sensitivity in Drosophila and milk factor in mice.

Unit- III

GENE AND GENE CONCEPT

Fine structure of the gene - Cistron, recon, muton - Operon concept,genetic code. Mutation - Molecular basis of mutation- Gene mutation, Chromosomal aberrations, mutagens.

Unit -IV

APPLIED GENETICS: Animal breeding, inbreeding, out breeding, heterosis -hybrid vigour, Eugenics, Euphenics and Euthenics. Inherited disorders in man.

Unit- V

POPULATION GENETICS – Hardy Weinberg principle, gene frequency, genotype frequency and factors affecting gene frequency. **Microbial genetics**-Introduction, bacterial recombination, Conjugation, Transformation, Transduction and sexduction.

TEXT BOOKS

Dalela, R.C. and Verma, S.R., 1970. A Textbook of genetics, Jai Prakash Nath and Company, Meerut.

Gopalakrishnan,T.S.,IttaSambasivaiah and KamalakaraRao,A.P.,1995-96.Himalaya Publishing House, Bombay – 400 004. 250 pp

REFERENCE BOOK

Verma, P.S. and Agarwal, V.K., 1995. Genetics, 8th edition, S.Chand & Co., New Delhi – 110 055. 580pp.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

MICROBIOLOGY

Class: III BSc **Semester: V**
Sub: Code: 5MZ13 **No. of Credit: 5**

Unit-I

HISTORY & SCOPE OF MICROBIOLOGY

History of Microbiology- Spontaneous generation. Biogenesis. Scope Microbiology in India. Outline classification of microbes- microbial kingdom- Protists, eukaryote, and prokaryotes- Five kingdom classification.

Unit-II

CLASSIFICATION AND SALIENT FEATURES OF MICROBES

Salient features of major groups- Bacteria, Virus, Algae, Fungi and Protozoa. Ultra structure of Bacterial cell wall, cilia, flagella, slime layer, capsule, pili, cytoplasmic membrane, cytoplasmic inclusions, sporulation.

Unit-III

STERILIZATION AND CULTURE TECHNIQUES

Sterilization principles: Dry heat, moist heat, Filtration, Pasteurization, Radiation**. Media preparation** - Liquid, solid. **Culture techniques** - Batch, culture, continuous, synchronous, fed batch. **Isolation of Pure culture**- Streak Plate, Pour- plate and dilution methods. (Serial dilution method).

Unit-IV

APPLICATION OF MICROBIOLOGY

Diary Microbiology - Milk & milk borne diseases. **Agricultural Microbiology** - Microbes as Biofertilizers, Biopesticides. **Industrial Microbiology**- Biomass into Bioenergy. Single cell protein. Production of Antibiotics (Penicillin), Biogas.

Unit-V

MICROBIOLOGY IN HEALTH AND DISEASES

Microbiology of drinking water. Analysis of water. **Medical Microbiology**- Pathogenicity, Virulence, Infection. **Bacterial diseases** - Diphtheria, Cholera, Typhoid, Leprosy, Tuberculosis. **Viral Diseases** - Poliomyelitis, Chicken pox, Measles, Mumps, Viral Hepatitis.

TEXT BOOK

Mani, A., Dr. Selvaraj, A.M., Dr. Narayanan, L.M., Arumugam, N., General and Applied Microbiology**,** SARAS Publications, Nagercoil.

REFERENCE BOOK

Ananthakrishnan. E & Panicker, C.K.1986. Text Book of Microbiology (Orient Longman Ltd., Chennai).

Michael. J.Pelzcar, Jr. Chan., E.C.S., Microbiology, Tata Mc Graw Hill edition, 1993.

Sharma, P.D., Microbiology, Rastogi publication.

Tauro, P., Kapoor, K.K., Yadav, K.S, An Introduction to Microbiology,Newage international (p) Ltd.,

Lasting M. Prescot, John. P. Harley, Donald. A. Klein, Microbiology, IVth ed. Mc Graw Hill Inc. New York.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY
EVOLUTION

Class: III B.Sc., **Semester: V**
Sub: Code: 5MZ14 **No. of Credit: 5**

Unit -I

INTRODUCTION

Fact of evolution. Evolution compared with ancient History, a preview of evolution, certain misconceptions of evolutionary biology, significance of evolutionary biology.

DEVELOPEMT OF THE IDEA OF ORGANIC EVOLUTION

Period of obscurity, Period of ancient Greeks and Romans, Pre-Darwinian period , Darwinian period, Post-Darwinian period, The agnostic period, The modern synthetic period , Present state of organic evolution.

Unit-II

ORIGIN OF LIFE

Hindu concept of origin of life. Theory of Special creation,
cosmozoic theory;A biogenesis, Biogenesis.

Theory of Chemical Evolution and spontaneous origin of life at molecular level. Experimental support of Oparin's hypothesis - UreyMiller experiment; Protenoid microspheres, RNA first model, Primitive earth ; Prebiotic synthesis; Evolution of progenote-origin and evolution of RNA , ribonucleoprotien, plasma-membrane, DNA evolution of eukaryotes, Molecular evolution.

Unit –III

DIRECT EVIDENCES OF EVOLUTION

Palaeontological evidences, fossils, fossilization,formation of rocks,dating of fossils,
Significance of fossils, Geological time table,Extinction.

INDIRECT EVIDENCES OF EVOLUTION

Evidences from taxonomy, comparative anatomy, comparative embryology, comparative physiology and biochemistry, comparative cytology and evidences from genetics.Geographical distribution.

Unit –IV

THEORIES OF ORGANIC EVOLUTION

Lamarckism, Neo-lamarckism;

Darwinism, Darwin-Wallace theory of natural selection, critical analysis of Darwinism, Neo-Darwinism.

Modern synthetic theory: Weismann's germ plasm theory;

Mutation theory: Characteristics of mutation theory, types of mutation, advantages of mutation theory, objections to mutation theory.

Unit –V

SPECIATION AND ISOLATION

Types of speciation – Phyletic and true patterns of speciation;

Allopatric and sympatric, quantum speciation.

Factors influencing Speciation. Isolation: origin, definition, types of isolation, types of Isolating Mechanisms, role of isolating mechanisms, origin of isolation. Micro and macro evolution.Orthogenesis and orthoselection.

TEXT BOOKS

Concept of Evolution,.Verma, P.S, Agarwal, V.K, S.Chand & Co., Ramnagar New Delhi 110055.

Principles of Organic Evolution, Ittasambasiviah Kamalakara Rao, Augustin Chellappa, S.Chand and Co., Ramnagar NewDelhi.

REFERENCE BOOKS

Richard Swann Lull. Organic Evolution,Light and Life publishers, New Delhi.

Introduction to Evolution, Moody, P.A., Kalyani publishers, NewDelhi.

Meaning of Evolution, Simpson G.G, Oxford and IBH publishing Co, New Delhi.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

ELECTIVE - 1 AQUACULTURE

Class: III B.Sc. **Semester: V**
Sub: code: 5EZ01 **No. of Credit: 5**

UNIT-I

INTRODUCTION

Definition and scope of aquaculture, salient features of aquaculture. Importance of fisheries, fishery resources of India-marine fisheries, estuarine fisheries, fresh water fisheries- riverine, reservoir, pond, cold water fisheries.

UNIT-II

CULTURE TECHNOLOGY

Construction and preparation of different types of ponds (nursery, rearing, stocking ponds). Management of fish farms-control of weeds and predators, liming and fertilization. Feeding and Harvesting in different types of ponds. Fish farm implements. Induced breeding technology-hypophysation and eyestalk ablation.

UNIT-III

BIONOMICS OF SOME IMPORTANT FRESHWATER CULTIVABLE FISH AND SHELL FISH

Indian majorcarps-catla, rohu, mrigala, minorcarp-calbasu, shell fish-*Macrobrachium rosenbergii*

TYPES OF CULTURE

Composite fish culture, culture in rice fields (pokkali culture), integrated fish culture, raceway culture. Transport of fish seed and brooders-traditional and modern method.

UNIT-IV

BRACKISH WATER CULTURE

Culture techniques for a crustacean and a fish- *Peaneus monodon, Chanos chanos* **MARICULTURE** - culture of mussels, pearl oyster culture. **FISHPATHOLOGY**:
fish diseases -viral,bacterial,fungal,protozoan,worms, crustaceans and abiotic disorders, symptoms of diseased fish, treatment and control measures.

UNIT-V

POST HARVEST TECHNOLOGY

Rigormortis, spoilage in fish. Fish preservation -principles, traditional and modern techniques of fish preservation (chilling, freezing, canning, drying, salting and smoking). Institutes in aquaculture - ICAR, CMFRI, CIBA, CIFA, CIFT, IFA, MPEDA, FFDA and BWFFDA.

TEXT BOOKS

Shanmugam.K, Fishery biology and aquaculture, Leo Pathipagam, Chennai 83.

Santhanam,R N.,Sukumaran & Natarajan "A manual of fresh water Aquaculture", Oxford and IBH Publishing Co., Pvt. Ltd.

REFERENCE

Jhingran V.G., Fish and fisheries of India, Hindustan Publishing Company,New Delhi BAL, D.V.and Virabhadra Rao, V., "Marine fisheries" Mc Graw Hill Publishing company, ltd, New Delhi.

Pillay T.V.R., Kutty M.N.,Aquculture principles and practices, Wiley-Blackwell, 2005 - Technology & Engineering - 624 pages

Govindaa, G.K., Fish processing technology, Oxford& IBH Publishing Pvt.Ltd.,

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DEPARTMENT OF ADVANCED ZOOLOGYAND BIOTECHNOLOGY

r DNA TECHNOLOGY

Class: III BSc. **Semester: VI**
Sub: code: 6MZ15b **No. of Credit: 5**

UNIT-I

GENE ANALYSIS

Direct selection, Molecular probing of genes, Identification of a clone from gene libraries. Nucleic acid hybridization, studying gene and genomic structure. Northern, Southern, and Western blotting techniques.

UNIT-II

DNA SEQUENCING TECHNIQUE

DNA sequencing- Restriction fragment, probe, Sanger Coulson method. Maxam Gilbert method- RELP techniques and application. Genetic fingerprinting, Polymerase chain reaction, Taq polymerase primers. Human genome project.

UNIT-III

APPLICATION OF GENETIC ENGINEERING

Alcohol production, Medicine- Insulin and Hepatitis vaccine production.

UNIT-IV

PRODUCTION OF SINGLE CELL PROTEINS

Algae- *Spirullina and Chlorella*, Fungi-*Candida and Saccharomyces*. Advantages and production of Biofertilizers- *Rhizobium, Azotobacter*, Phosphate biofertilizer.

UNIT-V

BIOPESTICIDES AND ITS APPLICATION

Field application and use of biopesticides (*Bacillus thuringiensis).* Intellectual property rights and protection- GMOS, IPR, PGR, GATT and Trade Related intellectual property (TRIP). Patenting of biological materials.

TEXT BOOK

A Text book of Biotechnology-R.C. Dubey.

REFERENCE BOOKS

Brown, T.A., (1955).Gene cloning, Third edition,Stanley Thomas Publication.
Old, R.W. and Primrose, S.B., Principles of gene manipulation, (1994).
V Edition, Blackwell science.
Purohit, Biotechnology.
Benjamine Lewin, Gene, VII (2000), Oxford University press.
Schlegel, Genetic Engineering.

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DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

ENDOCRINOLOGY

Class: III B.Sc. **Semester: VI**
Sub: code: 6MZ16 **No. of Credit: 5**

Unit – I

INTRODUCTION

Definition - Neural versus hormonal coordination. Organization of endocrine glands in crustaceans. Neurosecretory cells and neurosecretion, concept of neuro secretion, X-organ, Y-organ, moulting, reproduction.

INSECTS

Anatomical organization, structure, hormones, endocrine control of metamorphosis, diapause, intermediary metabolism, Hormones in pest control.

Unit – II

VERTEBRATE HORMONES

Mammal-Localization and brief description of structure of endocrine glands, hypothalamus, pineal, pituitary, thymus, thyroid, pancreas, adrenal, ovary and testis. Hypothalamus-Releasing Hormones (Thyrotrophic Releasing hormones-TRH,Gonadotrophic Releasing hormones-GNTRH, Corticotrophin Releasing hormones - CRH).

Unit – III

HORMONES OF PITUITARY

Adenohypophysis - Adrenocorticotrophic hormone (ACTH), Growth hormone (GH) Prolactin (PRL). Luteinizing hormone (LH), Follicle Stimulating Hormone (FSH), Thyroid Stimulating Hormone (TSH), **Neurohypophysis-**Oxytocin, Parsintermedia-Melanocyte Stimulating hormone.

Unit – IV

ENDOCRINE GLANDS - THYROID, ADRENAL, PANCREAS AND GONADS.

Thyroid-Tri-iodole thyronine, Thyroxin.
Adrenal-Gluocorticoid, Mineralo corticoid.
Gonads-Progesterone, Androgens and Estrogens.
Insulin, Glucogon.

Unit - V

PINEAL GLAND AND A FEW COMMON ENDOCRINE DISORDERS

Pineal-Serotonin, Melatonin.A few common endocrine disorders. Acromegaly, Cretinism, Dwarfism, Gigantism, Goiter, Diabetes mellitus.

TEXT BOOKS

Dr.Ananthakrishnan, T.N., and Dr. Ananthasubramanian, K.S., Outlines of Animal Physiology, S.Viswanathan, Pvt. Ltd., Turner, Mammalian endocrinology.

REFERENCE BOOKS

Best and Taylor's 'Physiological basis of Medial practice, John R.Brobek- The Williams and Wilkinis corp.
Bentley, P.J., Comparative Vertebrate endocrinology, Chand & Co.Ltd., New Delhi.

Wiggles worth, V.B., Insect Physiology.
Barrington, Invertebrate Structure and function, Hazell Watson & Viney Aylesbury Bucks Ltd.,
Dr.Mrs.Ambika Shanmugam., Fundamentals of Biochemistry for medical students.

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DEPARTMENT OF ADVANCED ZOOLOGYAND BIOTECHNOLOGY

BIOCHEMISTRY

Class: III B.Sc. **Semester: VI**
Sub: code: 6MZ17a **No. of Credit: 5**

Unit I- WATER

Definition. Water, Properties of water, pH, and its importance in biological system. Buffers. Osmosis and osmotic pressure.

Unit II- CARBOHYDRATES:

Structure and Properties-mono, di, oligo and polysaccharides. Polysaccharides in plants-cellulose and starch: Synthesis and Degradation of Glycogen. Glucose metabolism- glycosis, Krebs cycle, oxidative phosphorylation and gluconeogenesis. Pentose phospate pathway.

Unit-III- CLASSIFICATION OF PROTEIN AND AMINO ACID

PROTEINS- Classification: Primary, secondary and tertiary structure of proteins and biological importance of proteins.
AMINO ACID - Classification based on functional groups. General reactions of amino acid catabolism: oxidative deamination, transamination and urea cycle

Unit- IV - LIPIDS

Classification and properties of lipids. Structure and biological importance of saturated, unsaturated fatty acids, cholesterol and bile acids. Fatty acids breakdown:β -oxidation, fate of acetyl co –A, ketone bodies and ketogenesis.

Unit- V- VITAMINS

Definition, occurrence, classification and structure-Vitamin A, thiamine , riboflavin,pantothenic acid , ascorbic acid , Pyridoxine , vitamin B12 , vitamin D,E,K .

TEXT BOOK

Ambika shanmugam- Fundamentals of biochemistry for medical students-.

REFERENCE BOOKS

Martin, D.W.,.Mayer P.A. and Redwell, V.W. Maurya Harper review of Biochemistry.,Asian Edition.
Lubert Stryer., Biochemistry,Freeman and co.
Lehninger, A.L., Biochemistry, Worth Publishing Co, New York.
Jain, J.L.,Fundamentals of Biochemistry.
Conn, E.E. and.Stumps, P.K., Outlines of Biochemistry, John Wiley and Sons Publications.

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DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

ELECTIVE 2 - POULTRY KEEPING

Class: III B.Sc. **Semester: VI**
Sub: code: 6EZ02 **No. of Credit: 5**

Unit – I

INTRODUCTION TO BIOLOGY AND CLASSIFICATION OF FOWL

Biology of fowl- External morphology, digestive system and reproductive system. Common breeds of fowl-American breeds, Asiatic breeds, Mediterranean breeds, English breeds.Classification **a.** meat type **b.** egg type **c.** dual type.

EGG STRUCTURE & COMPOSITION

Grading of eggs, preservation of eggs for industrial use, nutritive value, abnormal eggs, and factors affecting egg size.

Unit – II

HOUSING AND NUTRITION

Essentials of a good house, location of a laying house, laying house construction, laying house equipment, uses of manure. Major feed ingredients, Feed formulations and additive

Unit – III

INCUBATION

Principles and practice, length of incubation period, physical factors affecting effective incubation. Selection and care of hatching eggs.
Artificial incubation, kinds of incubators, hatchery management problems, sexing of chicks.

Unit – IV

DISEASES

Prevention and control, vaccination and its precautions. Ecto and endo parasites of a fowl. Brief account of four common bacterial and four viral diseases of a fowl and their control measures.

Unit – V

STORAGE AND MARKETING OF EGGS

Quality in fresh laid eggs, determining quality by candling, deterioration in quality and its causes. Preserving eggs for home use, packing eggs for market. Marketing problems.

TEXT BOOK

Jull, Marley. A Poultry Husbandary, Tata Mc Graw Hill, New Delhi.

REFERENCE BOOKS

Mack O.North., Commercial chicken Production Manual.
Bundy, Live stock and poultry production.
Thomas. Singh, 1982.Farm animals Management and Poultry Production.Vikas Sastry, Publishing House, New Delhi, 639 pp.
Harbans Singh and Eari N.Moore-1982, Livestock and Poultry Production, Prentice Hall of India, New Delhi.

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DEPARTMENT OF ADVANCED ZOOLOGYAND BIOTECHNOLOGY

ELECTIVE 3 - BIODIVERSITY CONSERVATION

Class: III B.Sc. **Semester VI**
Subject: code: 6EZ03 **No. of Credit: 5**

Unit I

BIODIVERSITY:

Definition, Convention on Biological Diversity; Characterization of Biodiversity: Species Diversity, Genetic Diversity and Ecosystem Diversity. Measurement of Biodiversity: Measurement of Genetic Diversity, Phenetic diversity, Allelic diversity and Sequence variation.Magnitude and Distribution: Ecosystems and habitats -hotspots in India.

Unit II

LOSS OF BIODIVERSITY:

Forest Degradation-Human influences on Biodiversity-illicit removal of timber, fuel, fodder, Shifting cultivation, Poaching, Grazing,Fire, Developmental activities-Urbanization , Fragmentation- Habitat loss, Diseases: Plant parasites, insects and fungi, Abiotic: Fire -Flood-Cyclone, acid rain -Pollution of soil, water and atmosphere. Status of Species: Extinction-Endemic Endangered-Vulnerable. Rare- threatened-Red Data Book.

Unit III

BIODIVERSITY VALUES:

Use or active values: Direct values –Food-Medicines-fuel–fodder, fishery, agriculture. Indirect Values: Environmental process-Carbon fixation, pollination, Gene flow, Water cycle, Nutrient cycle, Absorbing and decomposing the pollutants. Ecological services: protecting watershed, Soil formation and protection from erosion, regulating climate.Non-Use or Passive value: Vicarious use value-Bequest, Existence value, Ethical Value and Option Value.

Unit IV

BIODIVERSITY CONSERVATION:

Insitu: National parks, Sanctuaries, Nature reserves. Biosphere reserves -Reserved and protected areas– Keystone species project-Sample plots-Preservation plots.
Exsitu: Botanical Gardens, Zoos, Aquaria, Gene Banks.
Exsitu techniques: Conservation through joint forest management,Biotechnology for Biodiversity Conservation.

Unit V

ACTS:

Legal Acts and Policies: Environment (Protection) Act 1986. Indian Forest Act 1927, Wildlife (Protection) Act 1972, Forest (Conservation) Act 1980, Biological Conservation Act 2002, Air (Prevention and Control of Pollution) Act 1981,Water (prevention and Control of Pollution) Act 1974. Public Interest Litigation (PIL) implementing Environmental Acts. Role of people and NGO for Biodiversity conservation.

TEXT BOOKS

Khan, T.I and Shishodia, Y.S., Biodiversity conservation and Sustainable, Development Pointer publications, Jaipur, 302003. (India)

Pandey, B.N., 2002. Eco-Degradation, Biodiversity and Health, Daya Publishing House, Delhi, 110035.

REFERENCE BOOK

Dr.Raju, R.A., 1997. Forest Wealth of India, Daya Publishing House, Delhi, 110035.

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DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

MAIN PRACTICAL -3

Class: III BSc **Semester: VI**
Sub: Code: 6MZP3 **No. of Credit: 5**

A. GENETICS

1. Study of the biology of Drosophila, Medium preparation.
2. Observation of common mutants of Drosophila.
3. Preparation of mounts of the Salivary gland Chromosomes in Chironomous larva.
4. Human blood groupings.

B. ANIMAL PHYSIOLOGY

1. Survey of digestive enzymes in Cockroach.
2. Study of human salivary activity in relation to temperature.
3. Estimation of oxygen consumption in fishes with reference to body weight.
4. Study of ciliary activity in Freshwater Mussel in relation to temperature.
5. Detection of nitrogenous waste products in fish tank water, bird excreta and Mammalian kidney.
6. Use of Kymograph.

C. AQUACULTURE

1. Identification of cultivable important organisms.
   Catla / Rohu / Mrigal – Clarius channa sp**.** *Penaeus monodon***,** *Mussels, Pearl oyster*.

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MAIN PRACTICAL - 4

Class: III B. Sc . **Semester: VI**
Sub: Code: 6MZP4 **No. of Credit: 5**

A. BIOTECHNOLOGY

1. Observation of *E.coli*. (Slide)
2. Blotting technique (Demo only) - Southern / Western blotting
3. Visit to Biotechnology Lab.

B. MICROBIOLOGY

1. Isolation & Cultivation of soil microorganism.
2. To stain Bacterial smear by using gram staining technique.
3. Preparation of media
   a. Broth
   b. Agar – Slants
   Stab
   Plating
4. Spotter – *E.coli*
   Penicillium
   Aspergillus
   Candida albicans
   Autoclave

C. BIOCHEMISTRY

1. Qualitative analysis of simple sugars in urine and blood samples
2. Qualitative analysis of proteins and ketone bodies in urine samples
3. Quantitative estimation of proteins
4. Preparation of Starch from Potato (Demo only)
5. Preparation of Caesin from milk (Demo only)
6. Preparation of Glutein from Wheat flour (Demo only)

D. POULTRY KEEPING

1. Identification of common breeds of fowl White Leghorn, Black Minorca
2. Candling of eggs.
3. Equipments used in Poultry Industry.
4. Report of field trip to a model Poultry farm.

E. IMMUNOLOGY

1. Identification of Primary lymphoid organs
2. Antigen Antibody Reactions-
   a. Agglutination
   b. Immunodiffusion
   c. Immunoelectrophoresis

3. ELISA

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DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

ALLIED ZOOLOGY-I

Class: I B.Sc Plant Biology & Plant Biotechnology **Semester: I**
I B.Sc Chemistry - B batch **No. of Credit: 4**
Sub: Code: 1AZC1a

Unit-I – INVERTEBRATA

PROTOZOA AND PORIFERA

Phylum: Protozoa Type study- *Entamoeba histolytica* & *Plasmodium vivax Paramecium caudatum*
Phylum: Porifera Type study - *Leucosolenia*
.

Unit-II

COELENTERATA AND PLATYHELMINTHES

Phylum: Coelenterata Type study-*Obelia geniculata*, polyp- medusa comparison, Alternation of Generation.
Phylum: Platyhelminthes Type study-*Fasciola hepatica*

Unit-III

ANNELIDA AND ARTHROPODA

Phylum: Annelida Type study- *Leech* & parasitic adaptation.
Phylum: Arthropoda Type study *Penaeus indicus*, Insect mouth parts- *Cockroach,Mosquito, Housefly, Honey bee.*

Unit-IV

MOLLUSCA AND ECHINODERMATA

Phylum: Mollusca Type study - *Lamellidens marginalis*
Phylum: Echinodermata Type study - *Star fish*

Unit-V

CHORDATA

General characters.
Sub Phylum Prochordata Type-Amphioxus structure and affinities.
Sub Vertebrata Type study Shark -Morphology, Digestive, Respiratory, circulatory, Nervous, Urinogenital systems. Comparative study of the brain and heart of shark, frog, calotes, pigeon and rabbit.

TEXT BOOK

Ayyar,E.K., Outlines of Zoology (Ancillary) Vol.I & II,Viswanathan,S.,(printers and publishers).

REFERENCE BOOKS

Jordan, E.L., Verma P.S., Invertebrate Zoology, Chand and Co., Ltd. New Delhi.
Jordan, E.L., Verma P.S.,Chordate Zoology and Animal physiology, S.Chand and Co., Pvt. Ltd. New Delhi.

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DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

ALLIED ZOOLOGY II

Class: I BSc Plant Biology & Plant Biotechnology **Semester: II**
I BSc Chemistry - B **No. of Credit: 4**
Sub: Code: 2AZC2a

Unit-I

CELL BIOLOGY

Ultra structure of an animal cell, ultrastructure and function of Mitochondria, Golgi body, Nucleus, Nucleolus, Ribosomes.

Unit-II

GENETICS

Sex Linkage, and Sex determination, Structure of DNA, Genetic Disorders in man - Phenylketonuria, Alkaptonuria, Albinism, Thalassemia,Tyrosinosis, Diabetes mellitus. Gene concept and Basic Genetic Engineering.technique.

Unit-III

DEVELOPMENTAL BIOLOGY

Cleavage and Gastrulation of Rabbit.

Unit-IV

HUMAN PHYSIOLOGY

Mechanism of heart beat, Heart diseases- Rheumatic heart disease, Myocardial Infarction, Stroke, Ischemia, and Angina.Physiology of Excretion-Structure of Kidney, Nephron. Urine formation. Osmoregulation in Vertebrates-Freshwater Teleost, Marine Teleost.

Unit-V

ECOLOGY AND EVOLUTION

HABITAT ECOLOGY

Abiotic factors- Soil, Light, and Temperature.
Biotic factors- Animal relationship- Interspecific- Commensalism, Symbiosis, Parasitism.
Natural Resources: Renewable –forest , Non-renewable -Minerals

EVOLUTION

Factors responsible for speciation.

TEXT BOOKS

Cytology- P.S.Verma & V.K Agarwal .Chand &Co. Ltds

Text book of Genetics- R. Dalela & S.R. Verma S.Chand &Co.Ltd

Elements of Embryology by N. Arumugam, Saras Publication, Nagercoil

Embryology, Ecology & Physiology by N. Arumugam. Vol. III Saras Publication, Nagercoil

Cell biology, Genetics & Evolotion by N. Arumugam. Vol. IV

Animal Ecology and distribution of Animals- Veer Bala Rastogi and M.S. Jayaraj Kedar nath –Meerut, Ram nath – Delhi.

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DEPARTMENT OFADVANCED ZOOLOGY AND BIOTECHNOLOGY

Allied Zoology Practical

Class: I. B.Sc. Chemistry and **Semester:II**
I. B.Sc. Plant Biology and Plant Biotechnology **No. of Credit: 4**
Subject Code: 2AZPa

Dissection

Earthworm	:	Nervous System
Cockroach	:	Digestive System
		Nervous System
Frog	:	Digestive System
		Arterial System (Demonstration only)
Calotes	:	Digestive System
		Urinogenital System

Animal Associaton

Ectoparasite	:	Leech
Endoparasite	:	Tapeworm
		Ascaris male
		Ascarie female
Mutualism	:	Sea anemone and Hermit crab

Mounting

Earthworm	:	Body setae
Mosquito	:	Mouthparts
Frog	:	Brain

Spotters

Entamoeba histolytica, Paramoecium caudatum (entire, conjugation) Obelia colony, Obelia medusa, Fesciola hepatica (entire, T.S) T.S of Taenia soluim,T.S of Leech, Freshwater mussel entire, Starfish oral view, Starfish aboral view.Amphioxus entire, Shark lateral view, ventral view, frog entire, Calotes entier, Pigeon entire, Quill feather, Rat entire.

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

COMPUTER APPLICATIONS, BIOINFORMATICS AND BIOSTATISTICS
[ELECTIVE PAPER]

Class: III BSc **Semester: III**
Sub:Code: **No. of Credit: 5**

Unit-I

INTRODUCTION TO COMPUTERS

Introduction to computers- the advent of computers; Generations of computers; Types of computers [micro, mini'super computers and main frame computers]. Elementary concepts of computer architecture. Binary number system and Boolean Logic.

Computer hardware-CPU and other peripheral devices-input units [key board, mouse' light pen, space balls, joystick]; output units [VDU, plotters and printer].

Unit-II

COMPUTER SOFTWARE

Computer software-stored program concept, Computer programming-Machine languages, operating systems-DOS, windows, Ms Office [Ms Word, Ms excel], High level languages-"C"

Unit-III

MEDIA NETWORKING AND OTHER APPLICATION

Multimedia, networking- workstations, client server. Internet and its applications. Needfor computers in biology, algorithms, statistical analysis using computers, computers in medical imaging-CAT and MRI.

Unit-IV

BIOINFORMATICS-DNA AND PROTEIN STRUCTURE ANALYSIS

Concepts and scopes of bioinformatics, Data mining, DNA structure, determination and sequence analysis, protein structure, determination and sequence analysis.

Unit-V

BIOSTATISTICS

Scope of biostatistics, collection, classification tabulation of data. Graphical representation-scattered diagram, histogram, piediagram. Measures of central tendency-Mean.median, mode.Standard deviation. Test of significance- student's t test.

REFERENCE BOOKS

Alan fielding 1985. Computing for biologists.

V.Rajaraman, Fundamentals of computers, prentice hall of India pvt. Ltd.

Altwood, T.K. & Paray Smith D.J. (1990) Introduction to Bioinformatics. -Pearson education Ltd.

Ignachimuthu – Bioinformatics

MEENAKSHI COLLEGE FOR WOMEN (AUTONOMOUS) CHENNAI-24.
DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

AQUARIUM FISH KEEPING [ELECTIVE PAPER]

Class: III BSc **Semester:**
Sub: Code: **No. of Credit: 5**

Unit-I

Introduction & Scope. Aquarium fish for hobby as well as commerce- role of aquarium fish in the national and international markets.

Unit-II

Aquarium fishes-classification based on breeding and habitat, Exotic and endemic species, valid strains, varieties and variant forms. Importance of water quality –pH, co2, temperature, ammonia, nitrite and nitrate.

Unit-III

Food and feeding habits-culture of live feed organisms- Daphnia,infusoria, microorganisms and mosquito larvae-their quality assessment; types of formulated feeds, composition of formulated feeds, preparation and storage- quality control. Parasites and diseases: method of treatment, prophylactic measures.

Unit-IV

Aquarium accessories-air pumps-filters-their operation and maintenance-trays-types of tanks-construction of glass tank-preparation and maintenance of fresh water, brackish and sea water aquarium.

Unit-V

Breeding techniques for common varieties [guppies, mollies, sword tail, platys, angel fish, fighters and gold fish]. Transportation methods-budget: budget for setting up an aquarium fish culture practice on a commercial scale- project formulation—preparation of feasibility reports for aquaculture projects- loan availability—credit policies. Export potential.

REFERENCE BOOKS

Mills, Dick 1993. Aquarium fish. DK publishing book, DK publishing inc., New York-10016.
Spotte, S., 1991. Captive seawater fishes, argent chemical laboratories reference library, Seattle WA, USA.
M.K.G. Iyer & sons, madras.

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MEDICAL LABORATORY TECNIQUES [ELECTIVE PAPER]

Class: III BSc **Semester:**
Sub: Code: **No. of Credit: 5**

Unit-I

USE OF LABORATORY INSTRUMENTS

Principles, use and maintenance of laboratory instruments like autoclave, hot air oven, incubators, water bath, centrifuge, refrigerator, colorimeter, pH meter,h haemoglobinometer, haemocytometer, microtomes and balances.Cleaning care and sterilization of laboratory items such as glasswares. Sterilisation (flame, steam, chemical and pressure) preparation of reagents. Preparation of culture media and culture- vaccination and inoculation.

Unit-II

MICRO TECHNIQUE AND STAINING PROCEDURE

Microtecniques- tissue preparation, fixing, embedding, sectionig, staining and mounting- vital staining.

Unit-III

USE OF BLOOD PRESSURE APPARATUS

Clinical physiology: use of blood pressure apparatus and respirometer.

Unit-IV

BLOOD SAMPLING AND DIAGNOSIS

Blood-collection of blood samples, analysis of blood and basic hematological techniques blood and cell morphology, RBC, WBC total counts and differential counts in health and disease. Haematocrit, packed cell volume, erythrocyte sedimentation rater, fragility test, platelet count, reticulocytocrit, hemorrhagic disorders, clotting time, prothrombin time, test for deficiency in blood clotting factors.

Unit-V

URINE SAMPLING AND ANALYSIS-DIAGNOSIS OF FEW COMMON DISEASES

Urine: analysis of urine samples; chemical parameters routinely required to be analyzed. Pregnancy tests. Analysis of faeces, semen, CSF for chemical investigation.Pathology: organisms causing infectious diseases.viruses-measles, poliomyletis, hepatitis, HIV.Bacteria-tuberculosis, whooping cough, tetanus, diphtheria, cholera.protozoans-amoebic dysentery, malaria, leishmaniasis. Helminthes- ascariasis, filariasis, cysticercosis. Laboratory management and safety. Safe disposal of hospital wastes.

REFERENCE

Sood Ramnic, 1985.Medical laboratory Technology, Jaypee brothers, New Delhi
King, Maurice, 1976.a medical laboratory for developing countries, Oxford university press, ELBS Edition, Madras.
Samuel, K.M., Notes on clinical laboratory techniques, M.K.G. Iyer and sons Madras.

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DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

BASIC BIOLOGY (OPTIONAL PAPER)

Class: I B.A/BSc/B.COM **Semester: I**
Sub Code: IOB1 **No. of Credit: 2**

Unit-I

Basic concept of structure, function and perpetuation of lower and higher categories of plants - An outline importance of plants as basic components of Human survival and for maintenance of purity of atmosphere.

Unit-II

Environment and plants- Basic components of environment- structure of environment- Plants as pollution indicators- Greenhouse effect. Afforestation and deforestation with special reference to historically important events like Chipko and Narmada valley projects- Biogas production.

Unit-III

Animal relationship - Inter specific relationship – Neutralism, Symbiosis and Antagonism (Parasitism) Intra specific relationship- Animal Aggregation- Honey bee.

Unit-IV

Infection, pathogenicity & treatment: Bacterial diseases- Cholera, Typhoid, Tuberculosis. Viral Diseases- AIDS, Chicken Pox, Poliomyelitis.

Unit-V

Blood grouping and Rh factor, Syndromes – Klinefelter's , Turner's, Sex linked inheritance: X linked -Hemophilia, Colour blindness; Y linked- Hypertrichiasis; Incomplete - Xeroderma pigmentosm, Genetic Counselling.

TEXT BOOKS

Text book of Animal Physiology – N. Arumugam Saras Publications
Text book of Microbiology – N. Arumugam Saras Publications
Text book of Cytology, Genitics and Evolution – N. Arumugam Saras Publications

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BASIC BIOLOGY (OPTIONAL PAPER)

Class: Class: I B.A/BSc/B.COM **Semester: II**
Sub Code: 2OB2 **No. of Credit: 2**

Unit-I

Hormones- Characteristics of hormones, Hypo and hyper secretions ofThyroid, Pancreas, Adrenal, Gonads and its disorders.

Unit-II

Heart diseases, - Rheumatic heart disease, Angina pectoris, Myocardial Infarction. Urinary diseases - Cystitis, Urethritis, kidney stones.

Unit-III

Plants for medicines- names, Principles and methods of using plants for Cardiac ailments, Respiratory problems, Liver disorders, Memory enhancement, Conditioning hair and skin.

Unit-IV

Genetic engineering in plants - Tissue culture – Totipotency - Transgenic plants - Terminator seed technology - A brief account of biological warfare.

Unit-V

Gardining- Types of gardens- Details of kitchen garden, An outline: landscaping, propagation of plants cutting, layering and grafting, floriculture and cultivation of bonsai plants.

Text book

Text book of Animal Physiology – N. Arumugam, Saras Publications

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DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

BIOINSTRUMENTATION
(SKILL BASED SUBJECT)

Class: II BSc **Semester:III**
Sub Code: OBI **No. of Credit: 2**

UNIT-I

Principles, use and maintenance of laboratory instruments like Autoclave, Hot air oven, Incubators, Water bath, Colorimeter and pH meter.

UNIT-II

Basic principles, Parts, types and application of Spectrophotometer.

UNIT-III

Principle, Types and application of Centrifuge.

UNIT-IV

Principle and application of Electrophoresis- Native, SDS-PAGE.

UNIT-V

Basic principles and application of Chromatography- Paper chromatography, Thin layer chromatography, Column chromatography- adsorption chromatography and ion exchange chromatography.

TEXT BOOK

Bioinstrumentation- Veeralukari.L (2006) MJP publishers, Unit of Tamil Nadu Book House, Triplicane, Chennai-5.

REFERENCE BOOKS

Principles and Techniques of Biochemistry and Molecular Biology- Keith Wilson and John Walker (Sixth Edition),Cambridge, University Press (2005).

Practical Biochemistry – Plummer, T. (1971)

Chromatography- Srivatsava, T. (1976)

Laboratory Techniques- Jayaraman, T. (1985).

PUBLIC HEALTH AND HYGIENE I

Class: III BSc **Semester: IV**
Subject Code: OHG1 **No. of Credit: 2**

UNIT - I : Health Care Centres

Primary health care centre in India and its functions: Role of public health sector : Importance of Immunization and its schedule.

UNIT - II: Nutritional defficiency diseases, Symptoms and Treatment

Vitamin defficiency - Night blindness, Scurvy, Ricketts and Anaemia. Protein defficiency – Kwashiorkar and Marasmas.

UNIT - III: Epidemic Diseases, Prevention and Control

Vector borne diseases - Malaria and Dengue ; Protozoan diseases –Amoeabiasis.

UNIT - IV : Pesticides and Human Health

Pesticides – Organochlorine (DDT), Organophosphorous –Parathion; Insect Repellants (DEET) – its impacts on human health.

UNIT - V : Health Services Organisation

World Health Organization (WHO), United Nations International Children's Emergency Fund (UNICEF) and Indian Red Cross (IRC).

REFERENCES

1. SHUKLA G. S & UPADHYAY V. B. Economic Zoology , Rastogi Publications, Meerut .
2. VERMA . S . (1998) . Medical Zoology, Rastogi Publications, Meerut .
3. PARK and PARK. (1995). Text Book of Preventive and Social Medicine Banarasidas Bhanot Publishers.

PUBLIC HEALTH AND HYGIENE – II

Class: III BSc **Semester: V**
Subject Code: OHG2 **No. of Credit: 2**

Unit – I

Communicable Diseases Causes, symptoms and modes of transmission
Typhoid, Tuberculosis and Hepatitis.

Unit – II

Non - Communicable Diseases Causes, symptoms and Management
Hypertension , Coronary Heart Disease, Diabetes

Unit – III

Women and Health care
Menstruation and Menstrual hygiene – Menopause - Ailments related to pregnancy,
Stress – Factors responsible for stress – Stress coping mechanism

Unit – IV

Health and Exercise
Essential Nutrients, Unhealthy eating - Obesity-Weight Management

Unit – V

Role of an individual in Waste disposal
Kitchen waste, e waste, Medical waste

Books for Reference:

1. Park and Park, 1995. Text Book of Preventive and Social Medicine. M/S. Banarasidas Bhanot Publishers, Jabalpur.
2. Verma S. 1998. Medical Zoology, Rastogi Publications, New Delhi.