

**MOTHER TERESA WOMEN'S UNIVERSITY COLLEGE,
KODAIKANAL
Common Course structure for UG programmes under CBCS**

B. Sc. ZOOLOGY

**SEMESTER – I
CORE I (THEORY) - INVERTEBRATA – I**

Total hours:60

UNIT I

Introduction to principles of Taxonomy:

Protozoa, Metazoa, Radiata, Bilateria, Acoelomata, Pseudocoelomata and coelomata. General characters and classification upto class level with Few examples.

Protozoa:

Type study: Paramecium – General organization, Cyclosis, contractile vacuoles and reproduction.

General Topic: Life history, Pathogenicity and control Measures of Entamoeba and Plasmodium.

UNIT II

Porifera:

Type Study: Sycon – Histology, Spicules, Gemmules, Parenchymula larva. General Topic: Canal system in sponges.

UNIT III

Colenterata

Type Study: Obelia – general organization and Metagenesis.

General Topic: Corals and Coral Reef

UNIT IV

Platyhelminthes

Type Study: Fasciola hepatica – external morphology, digestive, Excretory and reproductive systems and Life history

General Topic: Parasitic adaptation – Platyhelminth Worms

UNIT V

Aschelminthes

Type Study: Ascaris – Sexual dimorphism – reproductive systems and Life cycle.

General Topic: Human nematode parasites – Ancylostoma, Enterobius, Wuchereria

REFERENCES

1. A Text Book of Invertebrates- N.C.Nair, S. Leelavathy, N.Soundarapandian, T.Murgan, Dr. N. Arumugam, Saras Publication, 2010
2. Invertebrate Zoology, Jordan, E.K. and P.S.Verma. 1993. 12thEdition.S.Chand&Co.Ltd., Ram Nagar, New Delhi.

3. Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca, Echinodermata, Kotpal, R.I., 1988-1992, Rastogi Publications, Meerut – 250 002
4. Manual of Zoology Vol. I (Invertebrates). Parts I&II. Ayyar, E.K. and T.N. Ananthakrishnan, 1992. S. Viswanathan (Printers and Publishers) Pvt Ltd. Madras.

CORE II (THEORY) INVERTEBRATA – II

45 hrs

semester -I

UNIT I

Annelida

Type Study: Nereis – External morphology, digestive system, Nephridia, Nervous and reproductive system.

General topic: Metamerism in Annelids

UNIT II

Arthropoda

Type Study: Prawn – Penaeus – External Morphology, appendages, digestive system, Excretory system, reproductive system and Development

UNIT III

General Topic: Social life of beneficial insects

Peripatus and its affinities

UNIT IV

Mollusca

Type Study: Pila – External morphology, Digestive System, Respiratory system, Osphradium and Reproductive system.

General Topic: Torsion in Gastropoda.

UNIT V

Echinodermata

Type Study: Starfish – External morphology. Pedicellaria, Water vascular system

General Topic: Larval forms in Echinodermata

REFERENCE

1. A Text Book of Invertebrates- N.C.Nair, S. Leelavathy, N.Soundara pandian, T.Murgan, Dr. N. Arumugam, Saras Publication, 2010
2. Invertebrate Zoology, Jordan, E.K. and P.S.Verma. 1993. 12th Edition.S.Chand & Co.Ltd., Ram Nagar, New Delhi.
3. (All Series) Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca, Echinodermata, Kotpal, R.I., 1988-1992. – Rastogi Publications, Meerut – 250 002.
4. Manual of Zoology Vol. I (Invertibrata). Parts I & II. Ayyar, E.K. and T.N. Ananthakrishnan, 1992. S. Viswanathan (Printers and Publishers) Pvt Ltd. Madras.

ALLIED I (THEORY) - BOTANY PAPER

5Hrs/ Week

UNIT I

Structure, Reproduction & Classification of Algae- Sargassum Economic importance of Algae
Fungi- General characters of fungi, life cycle Puccinia, Economic importance of Fungi

UNIT II

Structure of life cycle of Bryophyte - Funaria
Structure of life cycle of Pteridophyte -Lycopodium
Structure of life cycle of Gymnosperm- Gnetum

UNIT III

Brief Account of Meristems – Types Primary & structure of Dicot stem, structure of Monocot stem.

UNIT IV

Outline of Bentham & Hooker classification, Merits & Demerits
Characteristic features of the Following families: Rubiaceae, Caesalpinaceae, Asclepidaceae & Poaceae

UNIT V

Structure of Anther, Malegametophyte, Ovule, Femalegametophyte, Double Fertilization, dicot embryo, Endosperm & its types.

REFERENCE

- 1.K.N.Rao& K.V.Krishna moorthi
- 2.Pteridophytes- Rashid, Vashista
- 3.Gymnosperm- Sponse ,Vashista
- 4.Plant Anatomy -Pandey, Annie, Regland
- 5.Embryology of Angiosperm-S.S.Bhojwani& Bhatnagar
6. An Introduction to Embryology –P.Maheswari

ALLIED PRACTICAL I –BOTANY

5hrs/4 credits

Plant Diversity

1. Study of Permanent slides of the following
 - Algae
 - Oscillatoria(Harmonica)
 - Oedogonium(Nannandrium & Capcells)
 - Sargassum(Morphology)
 - Fungi
 - Puccinia(T.S of Wheat leaf uredospore Teleutospore)
 - Bryophytes
 - Funnaria (Habit)
 - Pteridophyte
 - Lycopodium(Morphology, T.s of Stem, L.S. of cone)

Gymnosperm - Genum (morphology, T.S. of Stem showing secondary growth, Genum ula, male cone, Female cone)

Taxonomy

2. Technical description and identification of the families those are included in the theory
 1. Rubiaceae,
 2. Caesalpinaceae,
 3. Asclepidaceae &
 4. Poaceae

Anotomy

3. Study of Apical meristem (shoot apex)
 - Tissues - Parenchyma, Collenchymas, Sclerenchyma, T.S of Dicot stem
 - Embryology
4. T.S of mature Anther, structure of Dicot Embryo, Structure of Ovule
5. Plant physiology

Experiments to demonstrate

- i Osmosis - thistle funnel experiment
- ii Evolution of oxygen during photosynthesis
- iii Evaluation of CO_2 during Respiration (Ganongs's respiroscope).

SEMESTER II

CORE III (THEORY) - CHORDATA

TOTAL HOURS: 90

UNIT I

General characters and Classification of Chordata: up to orders with a few examples

prochordata

Types study: Amphioxus

General topic: Affinities and systematic position of cephalochordate, Hemichordates and Urochordata.

UNIT II

Pisces:

Type Study: Shark

General Topic: Accessory respiratory organs in Fishes, migration of fishes.

UNIT III

Amphibia

Type Study: Frog (*Rana hexadactula*)

General Topic: Parental care in Amphibia, Neoteny in Amphibia

UNIT IV

Reptilia

Type Study: Calotes vesicolor – External morphology, circulatory, nervous, pectoral and pelvic Girdle only

General Topic: South Indian Poisonous and non- Poisonous snakes.

Identification – Poison apparatus, biting mechanism, Nature of venom, first aid and treatment.

UNIT V

Aves

Type study – Pigeon

General Topic: Migration of birds

fossil bird archaeopteryx as connection links.

Mammalia:

15

Type Study – Rabbit

General Topic: Dentition in Mammals, Adaptation of Aquatic mammals

REFERENCE

1. A Text Book of chordates – A. Thangamani, S. Prasanna kumar, L.N.Narayanan, Dr.N.Arumugam, Saras Publication, 2010.
2. A Manual of Zoology, volume II – Chordata. Parts I & II. M.Ekambatanatha Ayyar, T.N. Anantha Krishnan, 1992. S.Viswanathan (Printers and Publishers) Pvt.Ltd, Madras.
3. Chordate Zoology, Jordan E. L & Verma P. S., S. Chand & Company Ltd. 1998

SEMESTER II- PRACTICAL - I INVERTEBRATA AND CHORDATA

4Hrs /Week

Invertebrate

I. Diagram and description of

- | | |
|---------------------|--|
| 1. Earthworm | -Nervous System. |
| 2. Cockroach | -Digestive system, Nervous System, Reproductive system |
| 3. Pila | - Digestive system |
| 4. Frog or calottes | - Arterial System. |

II. Diagram and description

1. Earthworm - Body and Penial setae
2. Salivary apparatus & trachea of cockroach.
3. Appendages of prawn
4. Radula of pila
5. Placoid scales of shark
6. Brain of frog/Calotes.

III Spotters: _

- | | |
|---------------------------------|---------------------------------------|
| 1. Paramecium | -entire, binary fission, conjugation. |
| 2. Simple sponge | - Gemmule, Spicules |
| 3. Obelia | -Colony. |
| 4. Obelia | -Medusa. |
| 5. Physalia | |
| 6. corals | - any two |
| 7. Fasciola | -Entire. |
| 8. Ascaris - | -Male & Female |
| 9. Ancylostoma duodenal. | |
| 10. <i>Wuchereria Bancroft.</i> | |
| 11. Nereis. | |
| 12. Heteronereis. | |
| 13. Prawn | - Entire, Nauplius, Zoea and Mysis |
| 14. Peripatus | |
| 15. Honey Bee. | |
| 16. Silkworm. | |
| 17. Headlouse, flea. | |
| 18. Starfish | - oral and aboral view |

Chordata Spotters:

1. Amphioxus,
2. Balanoglossus
3. Ascidian
4. Shark.
5. Hippocampus.
6. Narcine.
7. Anabas
8. Clarius
9. Echeneis,
10. Eel
11. Rhacophorus
12. Hyla
13. Bufo
14. Chamaeleon
15. Draco
16. 2 poisonous snakes

17. 2 Non – Poisonous Snakes.
18. Birds – Beak & Feet of any two birds.
19. Bat.
20. Rabbit – Pectoral & Pelvic girdle
-- Limb Skeleton.

Study tour : Specimen collection tour is compulsory for first year students.
Field visit is compulsory.

ALLIED PRACTICAL I –BOTANY

UZOA21

5hrs/4 credits

Plant Diversity

1. Study of Permanent slides of the following

Algae	- Oscillatoria(Harmonica)
	- Oedogonium(Nannandrium & Capcells)
	- Sargassum(Morphology)
Fungi	- Puccinia(T.S of Wheat leaf uredospore Teleutospore)
Bryophytes	- Funnaria (Habit)
Pteridophyte	- Lycopodium(Morphology, T.s of Stem, L.S. of cone)
Gymnosperm	- Gentum (morphology, T.S. of Stem showing secondary growth, Gentum ula, male cone, Female cone)

Taxonomy

2. Technical description and identification of the families those are included in the theory
 1. Rubiaceae,
 2. Caesalpinaceae,
 3. Asclepidaceae &
 4. Poaceae

Anotomy

3. Study of Apical meristem (shoot apex)

Tissues	- Parenchyma, Collenchymas, Sclerenchyma, T.S of Dicot stem
	Embryology
4. T.S of mature Anther, structure of Dicot Embryo, Structure of Ovule
5. Plant physiology

Experiments to demonstrate

- i Osmosis - thistle funnel experiment
- ii Evolution of oxygen during photosynthesis
- iii Evaluation of CO₂ during Respiration (Ganong's respiroscope).

SEMESTER III- DEVELOPMENTAL BIOLOGY

TOTAL HOURS :60

CORE PARE IV

UNIT I

Definition: History of Developmental Biology - Theories of Preformation – epigenesis – Von Baer’s law and biogenetic theory. Gametogenesis – Spermatogenesis and Oogenesis.

UNIT II

Structure of egg and sperm of Amphioxus, frog, Chick and rabbit.

Fertilization, Early development, Physicochemical, Cytological and Biochemical aspects of fertilization, Cleavage and its pattern in Vertebrates; Morula – Types of blastula. Gastrulation – Fate maps – morphogenetic, Movements – neurula.

UNIT III

Organogenesis – Development of heart, brain, and eye in chick. Embryonic adaptation: Foetal membranes in Chick – placenta in mammals.

UNIT IV

Experimental embryology: Organizer Concept – field and gradients - amphibian metamorphosis and its hormonal. Control. Regeneration in planarians and Amphibian.

UNIT V

Applied embryology: Test tube babies –Birth control – Artificial insemination –IVF- Techniques in embryo culture.

Text book

1. A Text Book of Embryology. Dr. N. Arumugam.Saras Publication, 2010.

REFERENCE BOOK

2. Chordate Embryology -P.S .Verma & V.K.Agarwal---S. Chand & Co.1975.
3. Developmental Biology - Arumugam N. Saras Publicaion – kottar. 2007.
4. An introduction to embryology, – Balinsky B.I- W.B.Saunders Co., Philadelphia, 3rd edt., 1965.

SEMESTER-III - SERICULTURE

TOTAL HOURS : 45

UNIT I

Introduction to sericulture, moriculture, classification of Mulbery, Methods of cultivation.

UNIT II

Silkworm biology- taxonomy, life cycle , anatomy. Diseases of *Bombyx mori* -Viral, bacterial and fungal, Silkworm pest- Uzifly.

UNIT III

Seed /silkworm eggs. Structure – Commercial and reproductive, Seeds, Voltinism, Hiber nating and non hiber nating eggs.

UNIT IV

Rearing: Rearing house and appliances, Rearing processes. Chawkiworm rearing – optimum feeding, optimum Environmental conditions, care during rearing and cleaning. Selection of ripeworm, spinning, mounting, Harvesting, storage and transport.

UNIT V

Reeling – Stifling, reeling appliances – types of croissures, Country charka, cottage basin, filature units, Applications of silk.

TEXT BOOK

1. Applied Zoology- Dr.N.Arumugam, T.Murugan, J.Johnson Rajeshwar, R. Ram Prabhu, Saras Publication, 2010.

REFERENCE

2. G. Ganga & J. Sulochana Chetty, 1997. An introduction to sericulture (Oxford & IBH publ.Co.Pvt. Ltd.)
3. Hand Book of Practical Sericulture by Ullal and Narsimhanna. CSB. Bangalore

SEMESTER IV

MICROBIOLOGY & IMMUNOLOGY

CORE PAPER – V

TOTAL HOURS : 90

Microbiology

UNIT I Introduction

Definition & Scope of microbiology – Contributions of early microbiologists- General classification of microorganisms.

culture techniques:-

Sterilization – Culture media – Culture methods & techniques – Methods of isolation – Staining – Microbial growth & growth curve.

UNIT II

Applied microbiology:

Food microbiology – Food spoilage – Food poisoning – Food preservation.

Industrial Microbiology – Alcohol production – Production of Antibiotics – Penicillin and Streptomycin.

Environmental microbiology:-

Soil microbes – N₂ fixation – Biodegradation of pollutants – Xenobiotics – Heavy metal

UNIT III

Medical microbiology:-

Bacterial diseases – Tuberculosis – Streptococcal pneumonia – Cholera , Syphilis.

Viral diseases – Influenza – Polio – Hepatitis B – AIDS.

IMMUNOLOGY

UNIT IV Introduction

History and scope of Immunology

Immunity – Types of Immunity- innate and acquire, passive and active.

Lymphoid organs - Primary and Secondary Thymus, Bone Marrow, Bursa of fabricius, spleen, tonsil, lymph node, Payer's patches)

Immunoglobulin – Structure and functions, biological properties of Ig classes.

Interaction of Antigen and antibody complement activation.

UNIT V

Immune response, lymphocyte as unit of immune system, stem cell, T and B cell and Macrophages.

Human Immune response- primary and secondary responses- B cell activation. cell – Mediated Immune response- types of T cells and functions, Lyphokines. Major histo compatability complex.

1. **Text Book** Immunology & Microbiology, Dulsy Fatima, A. Mani, L.M. Narayanan, A.M.Selvaraj, Dr. N. Arumugam, Saras Publication, 2010

REFERENCE

1. Microbiology. Michel J. Pelezar, JR., E.C.S. Chan, Noel Company Ltd, New Delhi.
2. Immunology & Immunotechnology, Ashim K. Chakravarth, Published in India by oxford university press, 2006 / Jai Singh Road, New Delhi.
3. Immunology, I. Kannan, 2007, MJP Publishers, Chennai- 600005.

SEMESTER IV

PRACTIAL II- DEVELOPMENTAL BIOLOGY, MICROBIOLOGY , IMMUNOLOGY & SERICULTURE

4Hrs /Week

Developmental biology:

1. Observation of chick blastoderm
 - i. 24 hrs
 - ii. 48 hrs
 - iii. 72 hrs
 - iv. 96 hrs
2. Observation and study of different stages of frog embryo
 - i. Early cleavage
 - ii. Late cleavage
 - iii. Blastula
 - iv. Gastrula of frog – yolk plug stage
3. Placental types –diffuse, cotyledonary, discoidal and Zonary

Microbiology

1. Preparation of media – Natural Broth solid media (agar)
2. Plating techniques _ streak plate, pour plate and spread plate
3. Serial dilution techniques
4. Gram's staining
5. Hanging drop experiment
6. Screening of antimicrobial agent (Krby Bauer Method)
7. Observation of Instruments: Water bath, Laminar air flow, autoclave, Incubator, Hot air oven, Colony counter

8. Spotters:- Bacteria, Fungi, Algae, Spirogyra, Agaricus, Rhizopus, Bread mould, Protozoa- paramecium, Yeast.

Immunology

1. Observation and study of Lymphoid organs

1. Bone Marrow
2. Bursa fabricious
3. Thymus
4. Lymph node
5. Spleen

2. Observation and study of IgG, IgA, and IgM

Sericulture

1. Observation and study of

- i. Silk worm _ Life cycle, egg, larva, pupa and moth
- ii. Moutage of Netrika
- iii. Silkworm disease and pest- pebrine and uzifly
- iv. Silk gland

Study tour – visit to sanctuaries / parks / sericulture unit / poultry industry area/
Microbiology and Immunology lab compulsory.

SEMESTER V CELL BIOLOGY

CORE PAPER – VII

TOTAL HOURS : 60

UNIT I Introduction

Cell type – prokaryotic and eukaryotic

Microscopy: Detailed study of compound, Electron microscopes, X- ray diffraction and phase contrast microscopes.

UNIT II Cytological Techniques:

Detailed study: Fixation- processing –staining

Methods of DNA, RNA, Protein , Lipids and Polysaccharides –Ultracentrifugation

UNIT III

Ultra structure and functions of plasma membrane. Mitochondria, Glogi apparatus, Endoplasmic reticulum and Ribosomes.

Ultra structure and functions of Lysosomes, Centrioles, Nucleus and Nucleolus, Chromosomes- Structure and types

UNIT IV

Cell Division – Mitosis and Mitotic apparatus

Meiosis and synaptonemal complex

UNIT V

Cancer cells and Carcinogens:

Definition – Types – Causes – properties – Treatment- Oncogenes.

Text Book:

Cell Biology & Molecular Biology – Dr. N. Arumugam, Saras Publication, 2010.

Reference

1. Cell And Molecular Biology”(6th Ed) DeRobertis and DeRobertis – W.B. Saunders Co. Philadelphia, 1990.
2. Verma and Agarwal: “Cytology” – S. Chand & Co.Ltd. Ramnagar, New Delhi. 1991.

Semester V- BIOCHEMISTRY

CORE PAPER - VIII

TOTAL HOURS: 60

UNIT I

Concepts of pH and buffer. Oxidation reduction reactions.

UNIT II

Carbohydrates: Structure, Classification and Biological importance.

Proteins – Structure, Classification and Biological importance. Amino acid – structure and Classifications. Biosynthesis of amino acids, Catabolism of amino acids. Lipids – Structure, Classification and Biological importance. Cholesterol: Types, Synthesis and Significance

UNIT III

Enzymes: Classification, physico – chemical nature and Mechanism of enzyme action. Factors affecting enzyme activity, Co-enzymes and isozymes.

UNIT IV

Vitamins: Classification, Structure & Mechanism only. Hormones : Chemistry of human hormones only

UNIT V

Biochemical Techniques.

- P_H meter
- Colorimeter
- Chromatography
- Electrophoresis.

Text book

1. Biochemistry and Biotech. Dr. Annie Ragland, N. Arumugam., Saras Publication, 2010.

REFERENCE

1. Principal of Biochemistry (2006) by Lehinger, Nelson & M.M. Cox, CBS publishers & Distributors, 485, Jain Bhawan, Bhala Nath Nagar, Shahdara, Delhi – 110032. CBS ISBN 81-239-0295-6.
2. Harper's illustrated Biochemistry (2006) – Robert. K. Murray Daryl. K.Granner. Peter Mayes & Victor W.Rodwell. Prentice – Hall International.ISBN 0-8385-361-3.The McGraw-Hill Companies, Inc.

Semester – V - EVOLUTION

Core paper : IX

Total Hours: 60

UNIT I

Evidences for evolution (Morphological, Embryological, Physiological, Geographical and Geological).

UNIT II

Theories of Evolution – Lamarckism, Darwinism, Neo – Lamarckism, Neo – Darwinism, Mutation theory of Devries modern synthesis.

UNIT III

Variation – Sources of Variability – Gene mutation, Chromosomal mutation, recombination and variation, Hybridization, Isolating mechanism.

UNIT IV

Micro, Macro and Mega evolution (Allopatric & sympatric). Mimicry and adaptive coloration. Co-evolution.

UNIT V

Human evolution, horse evolution.

Text Book

Organic evolution, Dr. N. Arumugam., Saras Publication, 2010.

REFERENCE

1. Evolution by savage, II ed, 1973. Amerind pubsing Co.pvt Ltd.New Delhi.
2. Organic evolution, Rastogi. V.B. – Kadar Nath & Ram Nath, a7th ed,1988-89, Meerut.
3. Process of organic evolution by G. Ledyard Stebbins, II ed,, 1973, Praetica-Hall of India Private Ltd, New Delhi.

Semester – V - ENVIRONMENTAL BIOLOGY**Core paper : X****Total Hours: 60****UNIT I**

Physico-chemical factors: Light: Spectra (composition of light), Light on land, light in water. Biological effects of light. Temperature: Range, Diurnal variation, thermal Stratification, temperature tolerance, Classification of Organisms. Adaptation of extreme temperature, Biological effects of temperature. Medium and substratum: atmosphere and air; Lithosphere and soil; Hydrosphere and water.

UNIT II

Inter specific relationships and intra specific relationships - Types and example, colonization, aggregation, social organization, psychological.

Factors Population Ecology: Types, density, and estimation, natality, mortality, age, distribution, growth pattern - fluctuation and equilibrium biotic potential. Dispersal and distribution. Regulation of population.

UNIT III

Community, characteristics, diversity dominance, structure, Stratification, periodicity, fluctuation, Ecotone and edge effect, Ecological niche, equivalence, ecotypes, ecological succession, Ecosystem: Components, food chain and its types- food web, Ecological pyramids.

Energy flow and productivity – Examples (Pond and forests) - Biogeochemical cycles- carbon, N & P cycle.

UNIT IV

Habitats: Fresh water, Marine, Terrestrial and Estuarine habitats.

Pollution: Kinds sources of pollution, hazards of pollution to human, animals, plants and buildings./ Control and remedial measures.

Practical application of ecology in fishery, management, agriculture and forestry. Wild life conservation india.

UNIT V

Biodiversity: Types and levels-species diversity, values of biodiversity. Causes of erosion of biodiversity. conservation of biodiversity, application of remote sensing in biodiversity.

Text Book

Concepts of Ecology (Environmental Biology) - Dr. N. Arumugam., Saras Publication, 2010.

REFERENCE

1. Environmental Biology (Principles of ecology) by P.S. Verma & V.K. Agarwal, 2009, ISBN- 81-219-0859-0S. Chand &Co. Ram nagar, New Delhi- 110 055
2. Elements of Ecology by Sharma P.D, 7th edt,(2005), Rastogi Publication, Meerut – 2500002.

Semester – V – GENETICS & BIOSTATISTICS

ELECTIVE PAPER-I

Total Hours: 90

UNIT I

Mendel's Experiments.

Interaction of genes – Epitasis, Complementary and supplementary.

Multiple alleles – Blood groups – inheritance. Poly genetic inheritance- Inheritance of skin colour.

UNIT II

Linkage & Crossing over in drosophila. Chromosomal maps.

Sex chromosomes and sex chromatins

Sex determination in Man

Sex linked inheritance, sex influenced genes and sex limited genes.

Extra- chromosomal inheritance.

UNIT III

Bacterial transformation- Conjugation- Transduction- Gene regulation –Genetic code

Bacteriophages- Structure and replication.

UNIT IV

Syndromes: Down. Kilnefelter, Turner.

Inbreeding, Out breeding and Hererosis.

Eugenics, Euthenics and genetic counseling.

UNIT V

Statistical methods in genetics.

Collection of data; sampling methods, presentation of data, frequency analysis, parts of table, frequency distribution.

Figure: frequency polygon, frequency polycurve, Histogram, bar charts, pie diagram.

Population genetics: Hardy Weinberg Law-Chi square analysis, probability. Analysis of data: measures of central value calculation of mean, mode, median, standard deviation and standard error.

Coefficient of variation.

Text book

1. Genetic and biostatistics R.P. Meyyan, Saras Publication, 2010.
2. Basic concept of biostatistics. Dr. N. Arumugam., Saras Publication, 2010.

Reference book:

1. Genetic by P.K. Gupta, Rastogi Publication, 3rd ed, (2005-2006), ISBN-81-7133-842-9, Meerut – 250002.
2. Genetic by Verma P.S. and Agarwal V.K. 1989, revised ed, 2009, ISBN 81-219-3114-2. S.Chand & Co. New Delhi – 110055.

Semester – VI ANIMAL PHYSIOLOGY

Core paper: XI

Total Hours: 90

UNIT I

Nutrition, Feeding and Digestion:

Nutrition – Physiological role of carbohydrate, fats, protein, vitamins and minerals.

Feeding – types of feeding- microphages and macrophages.

Digestion – role of enzyme in digestion – Intra cellular and Extra cellular digestion – absorption of digested food materials.

Metabolism of carbohydrates, fat and proteins.

UNIT II

Respiration and Circulation

Respiration – Types of respiratory organs – Respiratory pigments – transport and exchange of gases control of respiration – biological oxidation anaerobiosis respiratory quotient. Circulation - Structure and function of human Heart, haemodynamics, ECG, Blood pressure, blood sugar and urea.

Excretion: Origin and Types of Nitrogenous wastes – Ammonotelism, Ureotelism and uricotelism – nephron – urin formation in man.

UNIT III

Homeostasis:

Ionic – osmoregulation, Euryhalian – Stenohaline – Osmoconformers – Osmoregulators – Osmoregulation in crustaceans, fishes.

Thermoregulation: Mechanism of regulation in ectotherms and endotherms- thermoregulation centers.

UNIT IV

Nerves coordination

Structure and types of neuron - synapse, condition of impulse through and across neuro-myoneural condition-reflex action-conditional reflexes.

Receptors and effectors: Ultra structure of skeletal muscle- physico chemical properties – mechanism of muscle contraction.

UNIT V

Neuro Endocrine System

Types of endocrine glands – pituitary, thyroid, parathyroid, adrenal and sex glands – their secretions and role- neurosecretory cells in insects.

Reproductive physiology: Human reproductive cycle and the role of hormones, Birth control measures.

Text book

1. Animal Physiology- A. Maria Kuttikan, Dr.N. Arumugam, Saras Publication, 2010.

REFERENCE

1. Animal Physiology- P.S Verma, B.S.Tyagi, V.K. Agarwal, II ed, 1978, S.Chand & Company Ltd. Ram Nagar, New Delhi – 110 055.
2. General comparative physiology by Hoar, S. William, 3rd ed, 1987, Prentice Hall of India Pvt. Ltd. New Delhi, 18 BN-0-87692-337-6.

Semester VI – Practical III CELL BIOLOGY, GENETICS AND BIostatISTICS, ANIMAL PHYSIOLOGY & EVOLUTION

5hrs/Week

Cell Biology:

1. Mitosis in onion root tip cells.
2. Identification of meiotic stages in *Tredescantia*.
3. Polytene Chromosomes in Chironomous larva.
4. Preparation of squamous epithelium.

5. Preparations of human blood smear.
6. Model – Mitochondria.

Genetics and Biostatistics

1. Calculation of mean, mode, median, variance and standard deviation using leaves.
2. Study of probability with two coins – tossing experiments.
3. Blood group types.
4. Model - DNA & RNA.
5. Observation of simple mendelian traits

Animal Physiology

1. O₂ consumption in a fish.
2. Examination of excretory products of fish, bird and mammal and detection of ammonia, urea and uric acid.
3. Counting of different types of blood cells using haemocytometer
Demonstration only.
4. Demonstration of blood pressure in Sphygmomanometer.

Evolution

1. Variation – finger prints
2. Finding out genetic drift in a small population using beads.
3. Vestigial organs.
4. Fossils.
5. Examples of evolutionary significance of peripatus, Limulus and Archaeopteryx. Animals with adaptive coloration. (leaf insects, stick insects and chameleon).

SEMESTER- VI- PRACTICAL-IV ENVIRONMENTAL BIOLOGY & BIOCHEMISTRY 5hrs/week

1. Estimation of dissolved oxygen in tap water and distilled water
2. Estimation of dissolved CO₂ in water samples.
3. Measurement of hardness of water by using detergent on distilled water and tap water
4. Estimation of salinity in water sample
5. sampling of animal population by using quadrat method
6. Detection of transparency of water by Secchi disc method
7. Animal association- symbiosis, parasitism, predation & commensalisms
8. Analysis and mounting of freshwater and marine planktons
9. Garden// pond/ forest eco system
10. Rain water harvesting/aquarium
11. adaptation of aquatic and terrestrial animals based on a study of museum specimen such as rocky, sandy, muddy shore animals, flying and burrowing animals

12. Study tour to the minimum of 3 days duration to be conducted compulsory. Exposing the students to different habitats, pollution areas, thermal hydropower projects, wild life sanctuaries, bird sanctuaries, snake & crocodile & report.

Biochemistry

1. Effect of temperature on salivary amylase activity
2. Measurement of P_H in various samples using P_H paper & P_H meter.
3. Beer's and Lambert's law verification using colorimeter
4. Amino acid separation using chromatography method
5. Qualitative tests for Carbohydrates and Lipids

SEMESTER VI-ELECTIVE PAPER- II

MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Total Hours: 90

UNIT I Molecular biology

DNA – as the genetic material, DNA structure, properties and functions. Types of DNA, Base pairs, constancy of DNA, replication, Different types of mutation and DNA repair mechanism – direct reversal, Excision repair, SOS repair, recombination.

UNIT II

RNA, Different types of RNA – mRNA, tRNA, rRNA, Processing of the precursor of mRNA

UNIT III

Genetic code, Protein synthesis - Transcription in prokaryotes, Translation, Ribosome, Polyribosome, Steps in protein synthesis. The lac operon; positive and negative control.

UNIT IV

Introduction, History and scope of Genetic Engineering. Basic steps in Gene cloning, Restriction enzymes. Cloning Vectors -Bacterial plasmids (p BR 322). Bacteriophage Vector – (Lambda). Animal vector – (SV 40)

UNIT V

Introduction of DNA into cells. Bacteria – Transformation, Animals – shot gun method, Liposome mediated fusion. Identification of recombinant hosts – Bacteria ,Application of Recombinant DNA in medicine and industry, Biohazards of recombinant DNA.

Text book

1. Molecular Biology & Genetic Engineering, L.M. Narayanan, Dr.N. Arumugam, A. Mani, Padmalatha Singh, A.M. Selvaraj, Saras Publication, 2010.

REFERENCE

1. Dubey R.C. 2001. A text book of biotechnology S. Chand & Co ,New delhi. Isbn 81-7133-412-1.
2. Gupta P.K. 1999. Elements of biotechnology Rastogi publication, Meerut, ISBN 81—7133-412-1.

SEMESTER VI-ELECTIVE PAPER- III

ANIMAL, PLANT AN ENVIRONMENTAL BIOTECHNOLOGY

Total Hours: 90

UNIT I

Origin, History, scope and Importance of biotechnology in India. Animal cell and Tissue culture: Animal cell culture media. physical, chemical functions of different constituents of culture medium, role of carbon dioxide, growth factors, Glutamin in culture medium, serum and protein free media and their application.

UNIT II

Types of cell culture; Primary and established culture, Organ culture Disaggregation of tissue cell separation, Cryopreservation.

UNIT III

Plant biotechnology: media preparation and sterilization micropropagation. Acrobacterium and crown gall tumors, Ti plasmid vector for transformation.

UNIT IV

Environmental biotechnology: Pollution control- waste treatment anaerobic, aerobic waste treatment, biodegradation, microorganism in pollution control. Bioremediation, biosensors and biofuels.

UNIT V

Transgenic animals: production and application. Advantages of Transgenic animals. Transgenic animals in livestock improvement, Transgenic in industry PCR, DNA finger printing, Ethical issues in animal Biotechnology. Stem cell culture - production and application.

Text book

1. Animal Biotechnology by Prof. V. Kumaresan, Saras Publication, 2010.

REFERENCE

2. Elements of Biotechnology. P. K. Gupta Rastogi and Co, Meerut. 1998.
3. Environmental Biotechnology. S. K. Agarwal, APH Publication Co, New Delhi – 1998.
4. Plant biotechnology. S. Ignacimuthu. Oxford and IBH Publication Co, New Delhi, 1997.

Semester III – EDP Practical only

2Hrs/ Week

Semester IV – BIOINFORMATICS

2Hrs/ Week

UNIT I

Scope of Bioinformatics and internet- creation of Websites-Use of Bio-Informatics.

UNIT II

Biological data bases – generalized data base – sequence and structural data bases- Primary and secondary data bases (protein data base only)

UNIT III

File formats BLAST, FASTA data retrieval with enterz and SRS – sequence similarity searches.

UNIT IV

Sequence alignment-pairwise and multiple sequences alignment-similarity and Homology.

UNIT V

Bio- informatics and drug discovery-target-lead-ligand-HTS-Target searching and drug designing-Docking.

Text book

Bioinformatics by R.Sundralingam, V.Kumaresan, Saras publication.2010