THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

DEGREE COURSE

B.Sc. ZOOLOGY

UNDER CBCS

(with effect from 2008-2009)

The Course of Study and the Scheme of Examinations

Year / Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
I Year I Semester	I	Language	Paper I		6	3	3	25	75	100
	II	English	Paper I		6	3	3	25	75	100
	III	Core	Paper I	Invertebrata	6	4	3	25	75	100
	III	Core Practical		Invertebrata And Chordata	3	-	-	-	-	-
	III	Allied I	Paper I	One out of 3 *	4	4	3	25	75	100
	III	Allied Practical			3	-	-	-	-	-
	IV			**Environmental Studies**	2	2	3	25	75	100
I Year II Semester	I	Language	Paper II		6	3	3	25	75	100
	II	English	Paper II		6	3	3	25	75	100
	III	Core	Paper II	Chordata	6	4	3	25	75	100
	III	Core Practical	Practical I	Invertebrata and Chordata	3	4	3	40	60	100
	III	Allied I	Paper II	One out of 3 *	4	4	3	25	75	100
	III	Allied Practical	Practical I		3	2	3	20	30	50
				Value Education	2	2	2	-	50	50
II Year III Semester	I	Language	Paper III		6	3	3	25	75	100
	II	English	Paper III		6	3	3	25	75	100
	III	Core	Paper III	Cell and Molecular Biology	4	4	3	25	75	100
	III	Core Practical		Cell and Molecular Biology, Genetics and Biotechnology	3	-	-	-	-	-
	III	Allied II	Paper III	One out of 3 *	4	4	3	25	75	100
	III	Allied Practical			3	-	-	-	-	-
	IV	Skill based Subject I	Paper I	**To choose one out of 2** 1. Public Health and Hygiene 2. Single cell protein culture	2	3	3	25	75	100
		Non-Major Elective I	Paper II	**To choose one out of 2** 1. Vermiculture 2. Poultry farming	2	2	3	25	75	100

Year / Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
II Year IV Semester	I	Language	Paper IV		6	3	3	25	75	100
	II	English	Paper IV		6	3	3	25	75	100
	III	Core	Paper IV	Genetics and Biotechnology	4	4	3	25	75	100
	III	Core Practical	Practical II	Cell and Molecular Biology, Genetics and Biotechnology	3	5	3	40	60	100
	III	Allied	Paper IV	One out of 3 *	4	4	3	25	75	100
	III	Allied Practical			3	2	3	20	30	50
	IV	Skill based Subject II	Paper II	**To choose one out of 2** 1. Bio fertilizer Production 2. Apiculture	2	3	3	25	75	100
		Non-Major Elective II	Paper II	One out of 4 ***	2	2	3	25	75	100
III Year V Semester	III	Core	Paper V	Biostatistics and Bioinformatics	5	5	3	25	75	100
	III	Core	Paper VI	Developmental Biology and Immunology	5	5	3	25	75	100
	III	Core	Paper VII	Animal Physiology	5	5	3	25	75	100
	III	Core Practical		Physiology, Developmental Biology and Immunology	3	-	-	-	-	-
		Core Practical		Environmental Biology, Economic Zoology	3	-	-	-	-	-
		Elective I	Paper I	**To choose one out of 2** 1. Bio-instrumentation 2. Human Endocrinology	6	5	3	25	75	100
	IV	Skill based Subject III	Paper III	**To choose one out of 2** 1. Pisciculture 2. Vegetable Meat culture	3	3	3	25	75	100
III Year VI Semester	III	Core	Paper VIII	Environmental Biology and Evolution	5	5	3	25	75	100
	III	Core	Paper IX	Economic Zoology	5	5	3	25	75	100
	III	Core Practical General	Practical III	Physiology, Developmental Biology and Immunology	3	5	3	40	60	100
	III	Core Practical	Practical IV	Environmental Biology, Economic Zoology	3	5	3	40	60	100
		Elective II	Paper II	**To choose one out of 2** 1. Bio-Chemistry * 2. Applied Entomology	6	5	3	25	75	100
		Elective III	Paper III	**To choose one out of 2** 1. Nanotechnology in Life Sciences 2. Micro biology	5	5	3	25	75	100

Year / Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
	IV	Skill based Subject IV	Paper IV	**To choose one out of 2** 1. Medical Lab Techniques 2. Industrial fishery Management	3	3	3	25	75	100
		Extension Activities				1				50
				Total	**180**	**140**				**3700**

* Note:

"For the students admitted in the academic year 2008-2009 those who have taken Biochemistry as allied subject, should not take Biochemistry as elective subject."

THIRUVALLUVAR UNIVERSITY

B.Sc. ZOOLOGY

SYLLABUS

UNDER CBCS

(with effect from 2008-2009)

I SEMESTER

PAPER I

INVERTEBRATA

Objective

To understand the systemic and functional morphology of various groups of invertebrates.

To study their economic importance, affinities and adaptations.

UNIT-I

Principles of Taxonomy - Binomial nomenclature - classification of the animal kingdom.

PROTOZOA: General characters and classification up to class with examples.

Type study plasmodium, parasitic protozoans (Entamoeba, Trypansosoma and Leishmania).

UNIT-II

PORIFERA: General characters and classification up to classes with examples.

Type study Sycon, Canal system in sponges.

COELENTERATA: General characters and classification up to classes with examples.

Type study - Obelia, Polymorphism

UNIT-III

HELMINTHES: General characters and classification up to classes with examples.

Type study - Taenia solium. Nematode parasites and diseases - Wuchereria bancrofti, Enterobius vermicularis, Ancylostoma duodenale.

ANNELIDA: General characters and classification up to classes with examples.

Type study - Earthworm, Trochophore larva, and its evolutionary significance.

UNIT-IV

ARTHROPODA: General characters and classification up to classes with examples.

Type study - Prawn. Peripatus and its affinities.

UNIT-V

MOLLUSCA: General characters and classification up to classes with examples.

Type study - Fresh water Mussel.

ECHINODERMATA: General characters and classification up to classes with examples.

Type study - Sea star. Echinoderm larvae and their significance.

Reference Books

1. Ekambaranatha Ayyar.M. and T.N. Ananthakrishnan, 1992. Manual of Zoology Vol. 1 [Ivertebrata], parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras.
2. Jordan, E.L. and P.S. Verma, 1993. Ivertebrate Zoology, 12th Edition. S. Chand and Co. Ltd, New Delhi.
3. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
4. Parker and Haswell, 1964. Text Book of Zoolgy. Vol I (Invertebrata). A.Z.T; B.S. Publishers and distributors, New Delhi.
5. L.A. Borradile and F.A. Pott. The Invertebrates. Cambridge University press.UK

6. Adam Sedgwick.1972 A student text book Zoology. Vol. I and II. Central book Depot. Allahabad.
7. P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.
8. Hyman L.H. The Invertebrate Vol. I-VI. 1955, McGraw Hill Co New York.
9. Barrington, E.J.W. 1969. Invertebrate structure and function. ELBS Publication.
10. Barnes. Invertebrate Zoology. Toppan international Co.

ENVIRONMENTAL STUDIES

(For all UG Degree Courses)

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES :

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

REFERENCES

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004. ENVIRONMENTAL STUDIES, BHARATHIDSAN UNIVERSITY PUB, 1, TRICHY

2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHY

3. KALAVATHY,S. (ED.) 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHY

II SEMESTER

PAPER II

CHORDATA

OBJECTIVES :

To understand the systemic and functional morphology of various groups of chordates.

To study their affinities and adaptations to different modes of life.

UNIT-I

1. Salient Features, General classification of Phylum Chordata upto orders.
2. Origin of Chordata.
3. Prochordata: General Characters and affinities of Hemichordata, Cephalochordata & urochordata

UNIT-II

PISCES

1. General characters and classification up to orders.
2. Type study : Shark.
3. Parental care.

AMPHIBIA

1. General characters and classification up to orders.
2. Type study : frog
3. Adaptive features of Anura, urodela & Apoda.
4. Parental care in Amphibia

UNIT-III

REPTILIA

1. General characters and classification upto order level.
2. Type study-Calotes.
3. Poison apparatus and biting mechanism of poisonous snakes.
4. Identification of poisonous and non-poisonous snakes.

UNIT-IV

AVES

1. General characters and classification upto orders
2. Type study-Pigeon
3. Characters of Archaeopteryx.
4. Ratitae.
5. Flight adaptation.

UNIT-V

MAMMALIA

1. General characters and classification upto orders.
2. Type study-Rabbit.
3. Flying Mammals.
4. Dentition in mammals.
5. Aquatic mammals.

References :

1. Ekambarantha Ayyar, M and T.N Ananthakrishnan 1992, A manual of Zoology Vol. II[Chordata]. S. Viswanaathan [Printers and Publishers] Pvt. Ltd., Madras.
2. Jordan E.L. and P.S. Verma 1995. Chordata Zoology and elements of Animal Physiology. S. Chand and Co., New Delhi.
3. Kotpal R.L. 1992. Vertebrata, Rastogi Publications, Meerut
4. Nigam.H.C. 1983 Zoology of chordates, Vishal publications, Jalandhar.
5. Waterman, Allyn J.et al.1971, Chordate Structure and functions. Mac.Millan and Co., New York.
6. Jollie. M. 1968. Chordate Morphology. East west press Pvt. Ltd., New Delhi.
7. Hyman. L.H. Comparative vertebrate Zoology. McGraw Hill Co., New York.

CORE PRACTICAL I

MAJOR PRACTICAL

CD*/Model/Chart - Anatomical observation and comment

Cockroach - Digestive, reproductive and Nervous system.

Frog - Digestive system, urino genital system, Arterial and venous systems.

MINOR PRACTICAL

Slides/Model/Chart – Identification (draw and label)

1. Cockroach: Mouth Parts.
2. Earthworm: Penial setae and body setae.
3. Honey bee, House fly, Mosquito - Mouth Parts.
4. Prawn - Appendages
5. Frog vertebrate: Brain and Hyoid apparatus.
6. Placoid Scales.

SPOTTERS

1. **Study of the following specimens to bring out and their adaptations to their respective modes of life.**
   Entamoeba, Trypanosoma, Leishamania, Sycon, Taeniasolium, Ancylostoma duodenale, Enterobius vermicularis, Ascaris, Wuchereria bancrofti, Chaetopterus, Leech, Limulus, Any Two Crustaacean Larvae, Starfish, Balanoglossus, Ascidian, Ichthyophis, Draco, Phyrynosoma, Seasnake and Bat.

2. **Study of the following specimens to bring out their biological significance;**
   Obelia, Corals (Any 3), Physalia, Porpita, Vellela, Trochophore Larva, Peripatus, Sacculina On Crab, Sea Anemone on Hermit Crab, Pearl Oyster, Bipinnaria Larva, Amphioxus, Epiceratodus, Shark, Anabas, Hippocampus, Narcine, Echeneis, Arius, Flying Fish Eel, Amblystoma, Axolotl Larva, Bufo, Hyla, Cobra, Krait, Ressel Viper, Echies Carinata, Python, Typlops, Turtle, Crocodile, Parrot, Pigeon, Owl, Woodpecker, King Fisher.

3. **Study of the following to relate structure and function:**
   Sponge Spicules, Obelia ployp, Taenia Scolex, Prawn Appendages, Pedicellaria of Star Fish, Placoid Scale of Shark, Quill Feather of Pigeon.

4. **Study of the following to draw labeled sketches:**
   T.S. of the Earthworm, T.S. of Leech, Obelia Meusa, T.S. of Amphioxus through Pharynx, T.S. Thro arm of sea star.

5. **Osteology**
   Study of the following skulls with reference to dentition – Cat or Dog, Rat or Rabbit, Man

   i. Pectroral girdles of Frog, Calotes, Pigeon, Rabbit/Rat.
   ii. Pelvic girdles of Frog, Calotes, Pigeon, Rabbit/Rat.
   iii. Fore limbs of Frog, Calotes, Pigeon, Rabbit/Rat.
   iv. Hind limbs of Frog, Calotes, Pigeon, Rabbit/Rat.
   v. Synascrum.

* REFERENCES:

1. Prof.Baskaran, HOD of Zoology, Iyyanadar Janagiammal College, Sivakasi Ph.No.04562-254100
2. www.prodissector.cum
3. www.sciencelass.cum
4. www.ento.vt.edu.

VALUE EDUCATION
(For all UG Degree Courses)

UNIT-I

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Reference Books

1. T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)
2. Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
4. Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
5. S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.

WEBSITES AND e-LEARNING SOURCES:

www.rkmissiondhe/.org/education.html/

www.clallam:;org/lifestyle/education.html/

www.sun.com/../edu/progrmws/star.html/

www.infoscouts.com

www.secretofsuccess.com

www.1millionpapers.com

http://militarlyfinance.umuc.edu/education/edu-network.html/

III SEMESTER

PAPER III

CELL AND MOLECULAR BIOLOGY

Objectives :

1. To learn the cytological techniques, the structure and functions of various cellular components.
2. To understand the integrated activity of the whole cell as in mitosis, meiosis and protein synthesis.
3. To understand the molecular basis of cell structure DNA structure and functions

UNIT-I

History of Cell and Molecular Biology - Principles of microscopes light and electron, Cytological Techniques of cell fractionation, Homogenization Centrifugation, Isolation of Sub-cellular components. Biochemical Techniques-Chromatography-Electrophoresis and their Applications.

UNIT-II

Cell - Cell Theory, Ultrastructure of Animal cell - structure, composition and functions - cell components - Plasma Membrane - Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysosmes, Centrioles & Mitochondria.

UNIT-III

Nucleus - Ultrastructure, Composition and Function - Nuclear Membrane Nucleoplasm - Chromosomes DNA, RNA, Protein synthesis - Nucleolus - Cell Division and Cell cycle - Amitosis, Mitosis and Meiosis and their significance

UNIT-IV

Cell - Cell signalling : Cell Surface receptors - second messenger system MDP kinase pathways - Signalling from plasma membrane to nucleus.

UNIT-V

Semi conservative replication, mechanism and enzymology of DNA replication, Structure and functions of DNA & RNA (mRNA, tRNA, rRNA).

References :

1. Cohn, N.S., 1979, Elements of Cytology, Freeman Book Co., New Delhi
2. De Robertis, E.D.P. and E.M.F. De Robertis, 1988. Cell and Molecular Biology, 8th edition, International edition Informes Hongkong. 734p.
3. Gies, A.C., 1979. Cell Physiology, Saunders Co., Philadelphia, London, Toronto, 609p.
4. Powar, C.B., 1989. Essentials of Cytology, Himalaya Publishing House, Bombay, 368p.
5. Verma, P.S. and V.K. Agarwal, 1995. Cell and Molecular Biology, 8th edition, S. Chand & Co., New Delhi, 567p.
6. Rastogi. S.C. Cell and Molecular Biology, 2008 2nd Edition, New Age International (p) Ltd., New Delhi.
7. G.P. Jayanthi 2009 Molecular Biology, M.J P Publ. Chennai.

IV SEMESTER

PAPER IV

GENETICS AND BIOTECHNOLOGY

Objectives :

Genetics

To know the principles of genetics, pedigree analysis and population genetics.

To learn some genetic studies in man and applied Genetics.

Biotechnology

To integrate biology with technology. To study the application of scientific and engineering processes in the processing of materials by biological agents.

GENETICS

UNIT-I

Introduction to Genetics – Basis of Mendelian inheritance and Mendelian laws – Interaction of Genes – Complementary Factors, Inhibitory and Lethal Factors – Atavism. Multiple Alleles – Blood Groups and their Inheritance in Human.

UNIT-II

Linkage and crossing Over – Drosophila – Morgan's Experiements – Cytological Evidence for Crossing Over. Sex determination and sex Linkage in Drosophila and Man.

UNIT-III

Non-Disjunction and Gynandromorphs – Cytoplasmic Inheritance – Maternal Effect on Limnaea [shell coiling], Fine structure of Gene – Cistron – Recon, Muton – Gene Regulation – Operon concept – Lac Operon

UNIT-IV

Mutation – Chromosomal Aberrations – examples from Human – applied Genetics – Animal Breeding – Heterosis, Inbreeding, Outbreeding, Out Crossing, Hybrid Vigour – Population Genetics, Hardy Weinberg Law – Gene Frequency, Factors Affecting Gene Frequency.

BIOTECHNOLOGY

UNIT-V

Definition – Tools of Genetic Engineering – Enzymes, linkers and adaptors, cloning vectors [plasmids, pBr 322, Phageλ, Cosmids and phagemids].

Techniques of genetic engineering – recombinant DNA Technology and gene cloning in prokaryotes [cDNA and genomic Library].

Applications of Recombinant DNA Technology, in Medicine & agriculture.

References :

1. Verma, P.S. and V.K. Agarwal, 1995 Genetics, 8th edition, S. Chand & Co, New Delhi – 110 055. 580 pp.
2. Gunther S. Stent, 1986. Molecular Genetics. Macmillan Publishing Co Inc. 773 pp.
3. Higgins II, Best GJ and Jones J [1996] Biotechnology – Principles and application Black Well Scientific Publication Oxford London.
4. Gupta P.K. Elements of Biotechnology [2001] Rastogi Publications, Meerut.
5. Dubey 2006 Text book of Biotechnology S. Chand & Co. New Delhi.
6. Gardener. 1991. Principles of genetics. 8th edition. John Wiley & Sons Inc. New York. Chichester, Brisbane, Toronto, Singapore.
7. Monroe. W. Strick Berger 2004 Genetics. Printice Hall of India New Delhi
8. Kumar H.D. 1998 A text book of Biotechnology, Affiliated East West pvt. Ltd., New Delhi.
9. Nicholls. 2002 Genetic Engineering, Cambridge University press. UK.
10. S. Gladis Helen Hepsyba and CR. Hemalatha 2009 Basic Bioinformatics MJP Publ. Chennai.

CORE PRACTICAL II

CELL AND MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY

A. CELL AND MOLECULAR BIOLOGY

1. Use of Microscope, Camera Lucida, Stage and Ocular Micrometers
2. Blood Smear Preparation - Differential count of W.B.C.
3. Total count of RBC and WBC using Haemocytometer
4. Mounting of Buccal epithelium.
5. Mitosis in onion root tip squash.
6. Study of prepared slides of histology:
   a) Columnar Epithelium
   b) Ciliated Epithelium
   c) Glandular Epithelium
   d) Cartilage T.S.
   e) Bone T.S.
   f) Cardiac muscle
   g) Striated Muscle
   h) Non striated muscle
   i) Neuron
   j) Male germ cell
   k) Female germ cell

B. GENETICS

7. Observation of common mutants of Drosophila.
8. Human blood grouping.

C. BIOTECHNOLOGY

9. Study of prepared slides, models or specimen.
   a) Escherichia coli
   b) Bacteriopage
   c) Plasmid
10. Demonstration of P.C.R. technique: Southern blot, Electrophoresis.
11. Visit to Biotechnology Lab and report.

ALLIED PAPER

CHEMISTRY I

UNIT - I

1.1 Extraction of Metals Minerals and Ore difference - Minerals of Iron, Aluminum and Copper - Ore Dressing or concentration of Ore - Types of Ore Dressing Froth Floatation and Magnetic separation.

1.2 Refining of Metals - Types of Refining - Electrolytic, Van Arkel and Zone Refining.

1.3 Extraction of Uranium and Thorium.

UNIT - II

2.1 Cyclo-alkanes preparation properties of Cyclo-hexane -- Bayers strain theory.

2.2 Polarization - Inductive effect, mesomeric effect and steric effect - (Acid and Base strength.)

2.3 Stereo isomerism - Types, Causes of optical activity of (lactic acid) and tartaric acid - Racemisation - Resolution - Geometrical isomerism - maleic and fumaric acid.

UNIT - III

3.1 Chemical Kinetics - Distinction between Order and Molecularity - derivation of First order rate equation - half life period of first order reaction - determination of rate constant of hydrolysis of ester

Catalysis - catalyst - auto catalyst - enzyme catalyst - promoters - catalytic poisoning - Active center - Distinction between homogeneous and heterogeneous catalysts - Industrial application of catalysts.

3.3 Photochemistry - Grothus Drapers law, stark einsteines law - quantum yield - photosynthesis, phosphorescence - fluorescence - chemiluminescence's - photosensitization.

UNIT - IV

4.1 VSEPR Theory - Shapes of Simple Molecules BF_3, PCl_5, SF_6 and XeF_6

4.2 Fuels - Calorific value of fuels - Non-conventional fuels - need of Solar energy - Applications - Bio-fuels.

4.3 Osmosis - Osmotic pressure - reverse osmosis - desalination of sea water.

UNIT - V

5.1 Nuclear Chemistry - Definition of Half life period - Group displacement law - Radioactive series. Nuclear Fission and Fusion - Application of nuclear chemistry in Medicine, agriculture, industries - C^{14} dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking. Naphthalene - Preparations, Properties and uses of Naphthalene - Structure of Naphthalene.

5.3 Elements of symmetry - unit cell - crystal lattice - types of cubic lattice - one example for each.

CHEMISTRY II

UNIT - I

1.1 **Co-ordination Chemistry:**

Nomenclature of co-ordination compounds - Werner Theory of Co-ordination Compound - Chelation - Functions and structure of Haemoglobin and Chlorophyll.

1.2 **Industrial Chemistry:**

Fertilizers and manures - Bio-fertilizers- Organic Manures and their importance - Role of NPK in plants - preparation and uses of Urea, Ammonium nitrate, potassium nitrate and super phosphate of lime.

1.3 Contents in Match sticks and match box - Industrial making of safety matches. Preparation and uses of chloroform, DDT, gamhexane and Freon.

UNIT - II

2.1 **Carbohydrates:**

Classification - structure of glucose - Properties and uses of starch - uses of Cellulose Nitrate - Cellulose acetate.

2.2 **Amino Acid and Protein:**

Classification of Amino Acids - preparation and properties of Glycine - Classification of Protein based on Physical properties and biological functions

2.3 Primary and Secondary structures of protein (Elementary Treatment only) composition of RNA and DNA and their biological role. Tanning of leather - alum (aluminum tri chloride tanning - vegetable tanning)

UNIT - III

3.1 **Electro Chemistry:**

Specific and equivalent conductivity - their determination - effect of dilution of conductance.

3.2 Kohlrawsh Law - Determination of dissociation constant of weak Electrolyte using Conductance measurement - Conductometric Titrations

3.3 P^H and determination by indicator method - Buffer solutions - Buffer action - Importance of buffer in the living system - Derivation of Henderson equation.

UNIT - IV

4.1 Paints - Pigments - Components of Paint - Requisites of a good paint. Colour and Dyes - Classification based on constitution and application.

4.2 **Vitamins:**

Biological activities and deficiency diseases of Vitamin A, B, C, D, E and K - **Hormones** - Functions of insulin and adrenaline.

4.3 Chromatography - Principles and application of column, paper and thin layer chromatography

UNIT - V

5.1 **Drugs-** Sulpha Drugs - Uses and Mode of action of Sulpha Drugs -- Antibiotics - Uses of Penicillin, Chloramphenicaol, streptomycin. Drug abuse and their implication alcohol - LSD

5.2 **Anaesthetics** - General and Local Anaesthetics - Antiseptics - Example and their application. Definition and one example each for analgesics antipyretics, tranquilizers, sedatives, causes for diabetes, cancer and AIDS.

5.3 Electrochemical corrosion and its prevention - fuel cells.

ALLIED PAPER

PLANT BIOLOGY AND BIOTECHNOLOGY I

UNIT-I: Cell Biology

Prokaryotic and Eukaryotic cell (plant cell)

Cell organells - Chloroplst, Mitochondrion and Nucleus.

Cell division - Mitosis and Meiosis.

UNIT-II: Anatomy

Tissues - meristematic and permanent tissues. Primary structure of dioct leaf. Structure of Monocot root and Monocot stem. Normal Secondary thickening of dicot stem.

UNIT-III: Bacteria and Viruses

Bacteria - General characters - shape - flagellation - grams staining. Structure of E. Coil - reproduction - (Vegetative and asexual), Economic importance. Viruses - General characteristics - structure of virus, structure of Tobaco mosaic virus, Bacteriophage.

UNIT-IV: Structure and Life History of

a) Chlorella, Sargassum and Gracilaria

b) Albugo, Penicilium and and Agaricus

UNIT-V: Structure and Life History of

a) Funaria

b) Lycopodium

c) Cycas

Economic importance of Chlorella, Penicillium and Agaricus.

PLANT BIOLOGY AND BIOTECHNOLOGY II

UNIT-I : Taxonomy

General outline of Bentham and Hooker's system of classification. Study of the range of characters and economic importance of the following families: Annonaceae, Rutaceae cucurbitaceae, Apocynaceae, Euphorbiaceae and Liliaceae.

UNIT-II: Embryology

Structure of mature anther. Structure of mature ovule and its types. Fertilization.

UNIT-III: Plant Physiology & Plant Tissure Culture

Absorption of water, physiological role of micro and macro elements their deficiency symptoms Photosynthesis - light reaction - Calvin cycle Respiration - Glycolysis - Kreb's cycle - electron transport system. Nitrogen cycle. Growth hormones - Auxins - Gibberellins and cytokinins. Tissue culture and its significance (basic principles).

UNIT-IV: Ecology

Ecosystem - basic components of ecosystem fresh water ecosystem. Energy flow in ecosystem - Trophic level, Food chain and food web. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses - interaction of genes - Complementary factors. Theories of evolution - Lamarckism, Darwinism and Devries.

BOOKS SUGGESTED

1. Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.
2. Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.

3. Rev. Fr. Ignacimuthy, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.
4. Rao, K.N. Krishnamoorthy, K.V. and Rao. G. (1975) Ancillary Botany. S. Viswanathan Private. Ltd., Chennai.

ALLIED PAPER

ECONOMIC ENTOMOLOGY I

Objectives :

To study the insect pests and their control measures.

To study the economic importance of insects as vectors, pollinators, predators & parasites.

UNIT-I

1. Classification of insects [Major orders].
2. Biology of Butterfly

UNIT-II

Beneficial insects. Mode of life, economic importance and development.

1. Honey bee.
2. Silk worm (Bombyx mori)

Silk Worm [Bombyx mori] rearing

1. Equipment required.
2. Rearing procedure up to harvesting of cocoons.

UNIT-III

Harmful insects
An account of any three pests of :

1. Rice 3. Coconut

2. Cotton

UNIT-IV

Principles and methods of pest control – Conventional, Physical, mechanical, chemical and Biological control.

UNIT-V

Vector borne diseases. A brief account of insect vectors affecting the health of man and domestic animals.

References :

1. B. Vasantharaj David and T. Kumaraswami 1982. Elements of Ecnomic Entomology, Popular book depot, Chennai.
2. Nayar, K.K., Ananthakrishnan, T.N. and B.V. David,V 1992 General and Applied Entomology Tata McGraw, New Delhi, 1
3. P.G. Fenemore Manual. Silkworm Rearing. FAO Agricultural Service Bulletin, Rome.

ECONOMIC ENTOMOLOGY II

Objective :

To study the basic concepts of pesticides and integrated pest control

UNIT-I

Insects and their interrelations with environments, Insects as Pollinators parasitoids, Scavengers and weed Killers

UNIT-II

Classification of insecticides – based on mode of action, contact, systemic, fumigants, nerve and stomach poison. Biological control. Integrated pest control.

UNIT-III

Basic principles of insecticide formulation and their application in pest control – Plant Protection appliances used – working and application.

UNIT-IV

Precautions in handling of pesticides. Pesticides and environmental pollution.

UNIT-V

Assessment to pest population, Estimation of pest damage – pest outbreak – pest surveillance.

References :

1. B. Vasantharaj David and T. Kumaraswami 1988. Elements of Economic Entomology. Popular book depot, Chennai.
2. Nayar, K.K., Ananthakrishnan, T.N. and B.V. David 1992 General and Applied Entomology Tata McGraw, New Delhi.

3. P.G. Fenemore, Alka prakash 1997 Allied Entomology, Wiley Eastern Ltd., New York.
4. Wiggles worth J.B., 1994. Insect physiology, Chapman and Hall, London.
5. Temphare D.B., 1984. A. Text Book of Insects Morphology, Physiology and Endocrinology. S. Chand and Co., New Delhi.

ALLIED PRACTICAL

CHEMISTRY

VOLUMETRIC ANALYSIS

1) Estimation of hydrochloric acid using std. sulphuric acid
2) Estimation of Borax using std sodium carbonate
3) Estimation of sodium hydroxide using std sodium carbonate.
4) Estimation of $FeSO_4$ using std. Mohr salt Solution.
5) Estimation of Oxalic acid using std $FeSO_4$
6) Estimation of FAS using Std oxalic acid
7) Estimation of Fe^{2+} using diphenylamine / N phenyl anthranilic acid as indicator.

ORGANIC ANALYSIS:

Reactions of aldehyde (aromatic), carbhohydrate, carboxylic acid (mono and dicarbox ylic), phenol, aromatic primary amine, amide and diamide. Systematic analysis of organic compounds containing one functional group and characterizationsss by confirmatory tests.

ALLIED PRACTICAL

PLANT BIOLOGY AND BIOTECHNOLOGY

1. To make suitable micropreparation describe and identify materials of Algae, Fungi, Bryophyte, Pteriophyte, Gymmosperm and angiosperm prescribed.
2. To describe in technical terms, Plants belong to any of the families prescribed and identify the family.
3. To dissect a flower, construct floral diagram and write floral formula.
4. To describe simple experimental setup in plant physiology.
5. To describe and identify the micro preparation materials of Embryology prescribed.

ALLIED PRACTICAL

ECONOMIC ENTOMOLOGY

MAJOR PRACTICAL

Model/Chart - Draw and Comment

1. Life Cycle of Holometabolous, Hemimetabolous and Ametbolous Insects (atleast one example in each)
2. Insect formulations and Plant protection appliances

MINOR PRACTICAL

Slides/Model/Chart - Identification (draw and label)

1. Mouth parts - Bed bug, Pediculus, Grasshopper and Butterfly
2. Sting apparatus of honeybee

SPOTTERS

Pests of Agricultural Importance - Citrus Butterfly, Rhinocerous Beetle, Stem borer - rice sugar cane, Cholam, cotton, Fruit Boer, Root Borer, Six spotted Beetle, Grasshopper, Crickets, Pod Borer (Pulses), Rice, Weevil, Mango nut Weevil. Pests of Medical Importance Mosquito, Housefly, Cockroach, Ticks, Mites, Louse, Bed bug, Plasmodium, Filarial worm, Loa loa, Dust Mite.

RECORD

Collection and Preservation of insects-Insect store box

Note: The students may be asked to submit a minimum of 10 whole mounts of the insects.

V SEMESTER

PAPER V

BIOSTATISTICS AND BIOINFORMATICS

Objectives :

To get a basic knowledge of statistical methods and computations in biology.

To study the application of information sciences (mathematics, statistics and computer sciences) in biology.

To study the application of information technology to the management and analysis of biological data.

UNIT-I

Biostatistics - Definition and Scope-Census and sampling methods-collection and presentation of Data. Diagrams and graphs; bar, pie Histogram, line graph-Concept of Statistical population and sample characteristics of frequency distribution sampling.

UNIT-II

Measures of Central tendency: mean, median mode and Measures of Dispersion, Range, Quartile deviation, Mean deviation & Standard deviation.

BIOINFORMATICS

UNIT-III

MS-WORD: File Operations New, Save & Print - Editing: Cut, copy, Paste, Find and Replace - Insert: Page numbers and Pictures - Format : Font, Bullet & Numbering, Paragraph and Background Tools: Spelling and Grammar - Data : Sort - MS. EXCEL: Presentation of Bio statistical data using Excel : Auto sum, Paste function, Chart wizard, sort function and Drawing - Use of Internet, Messenger and e-mail-Basic knowledge of Medical transcription and Bio-informatics.

UNIT-IV

Bioinformatics-Definition-Literature databases-NCBI-Pubmed, Medline, Protein and nucleic sequence databases-PIR, Swiss-prot, GeneBank, DDBJ-structure databases - PDB, SCOP, CATH, structure visualization Tools, RasMol, Swiss PDB viewer.

UNIT-V

Pairwise sequence Alignment – Scoring Matrice-PAM and BLOSUM-Statistics of alignment scored Dot plot – local and global alignment – Database Searching – FASTA and BLAST multiple sequence alignment clustal W-Phylogenetic trees-PHYLIP.

References :

1. Statistics – SP Gupta 1996 S. Chand and Co., New Delhi.
2. Jerold H. Zar Bio statistical analysis [2nd Edition] Printice Hall of International edition, 1984 [Relevant portions]
3. Goutham Roy. Introduction to Computing and Computing lab and Cad[2002] Books and allied [pvt] Ltd. Kolkata
4. MS. OFFICE for Win-Microsoft office press.
5. Developing Application with MS. OFFICE – Christine. Solomon-Microsoft Office Press.
6. Developing Bioinformatics Computer Skills Cynthia Gibbs, Sheoff Publishers & Distribtors Pvt. Ltd., Mumbai.
7. Arthur. M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003.
8. Arthur. M.Lesk, Introduction to Protein Structures Oxford University Press, New Delhi, 2000
9. Baxevanis, A and Outllette. Bioinformatics a practical guide to the analysis of genes and proteins, Wily - Interscience, Hoboken, NJ. USA 2005.

PAPER VI

DEVELOPMENTAL BIOLOGY & IMMUNOLOGY

UNIT-I

Spermatogenesis and oogenesis-comparative study of Invertebrate, vertebrate sperms and Eggs, polarity & symmetry of eggs-Fertilization Mechanism, physiology & theories-parthenogensis-Natural-Artificial-Experiements on Artificial parthenogenesis

UNIT-II

Cleavage-Factors influencing cleavage-Fate map-Blastulation and Gastrulation; General principles-physiology and comparative study in Amphioxus, Frog and chick-Experimental works of speerman and Mangold-Development of brain and eye in Frog-Regeneration in invertebrates.

UNIT-III

Embryonic adaptations: Embryonic membranes and their functions in chick – placentation in mammals. Puberty-Menstrual cycle-contraception-family welfare Reproductive technology: Artificial insemination-cryopreservation-IVF-Embryotransfer-Test tube babies-Bioethics.

UNIT-IV

Types of immunity-their role in parasitic, bacterial & viral infection, in hyper-sensitivity and graft rejection-Lymphoid organs, cells of immune system-their role in immune response-Antigen-Antibody reaction.

UNIT-V

Immunoglobulin-types, structure, physico chemical and biological properties-Immunoprophylaxis-Immunization schedule for children. Immuno deficiency – AIDS, Immunotechniques.

References :

1. Balinsky, B.I.,1981. Introduction to embryology Saundeers, Philadelphia.
2. Berril & Corp Developmental Biology. Mc Graw Hill Book Company, mc., New York.
3. M.S. Jayaraj An introduction to embryology Veer Bala Rastogi Publication.
4. Verma, P.S., V.K. Agarwal and Tyagi, 1995. Chordate embryology. S. Chand & co., New Delhi.
5. Majumdar, N.N. 1990. Text book of Vertebrate embryology. Tata McGraw-Hill publishing company Ltd., New Delhi.
6. McEwen, R.S., 1969. Vertebrate Embryology. Oxford and IBH publishing co., New Delhi
7. Jain, P.C 1998, Elements of Developmental Biology. Vishal Publication, New Delhi.
8. Dubey 2006 Text book of Biotechnology S. Chand and Co., New Delhi.
9. Roitt.I.M 2000 Essential Immunology, Blackwell scientific Publishers.
10. Paul, W.E.M. 1989, Fundamental Immunology, Raven press, New York.
11. Kuby. J. 1999, Immunology. W.H. Free man and Co. New York.
12. Current protocols in Immunology – 3 Volumes 1994 Wiley Publications.
13. Roitt. I,Brostoff, J. and Male. D. 2002. Immunology, Mosby, New York.
14. Richard, A. Golds, Thomas I, Kindt & Barbara. A. Osborne 2000 Kuby Immunology, Freeman and Co. New York.

PAPER VII

ANIMAL PHYSIOLOGY

Objectives :

To study the basic principles of animal physiology, chemical and physical properties of living matter.

To understand the physiology of various organs and organ systems.

UNIT-I

Nutrition-Food requirements-Carbohydrates, Proteins, Fats, Minerals, and Vitamins. Digestive-enzymes and their role in digestion – Metabolism-metabolic pathways with reference to carbohydrates

UNIT-II

Respiration-Respiratory pigments-and functions. Transport of gases [CO2+O2] - Respiratory quotient. Circulation:- Types, Composition, Properties and Functions of blood - Human - cardiac cycle-cardiac rhythm -origin of heart beat - regulation of heart beat - ECG - Blood pressure - factors contributing to heart problems - coronary circulation.

UNIT-III

Excretion - kinds of Excretory products - mechanism of urine formation in mammals - hormonal regulation of Excretion. Kidney Failure and Transplantation. Regulatory mechanisms - Osmoconformers - Osmoregulator - Muscles - Types of muscles - Muscle proteins - mechanism of contraction - Cori cycle - Theories of muscles contraction.

UNIT-IV

Nervous tissue - Neuron - Structure, types of neurons. Nerve Impulse - Synapse - Synaptic transmission of impulses - Neuro-transmitters. Receptors - Photoreceptor - mammalian eye - structure of retina - visual pigments - Physiology of vision- Phonoreceptors - Mammalian ear-organ of corti-working mechanism - Phonoreception in bat.

UNIT-V

Endocrine glands - structure, secretions and functions of Endocrine glands of vertebrates-pituitary, Hypothalamus, thyroids, parathyroid, Adrenal, Thymus, Islets of Langherhans, sex organs - Hormones of insects and crustaceans.

References :

1. Sambasivaiah, Kamalakara rao and Augustine chellappa 1990. A Text book of Animal Physiology and Ecology, S. Chand & co., Ltd., New Delhi - 110 055.
2. Parameswaran, Anantakrishnan and Ananta Subramananiam, 1975. Outlines of Animal Physiology, S. Viswanathan [Printers & Publishers] Pvt. Ltd.,
3. William S. Hoar, 1976. General and Comparative Physiology, Prentice Hall of India Pvt. Ltd., New Delhi - 110 001.
4. Wood, D.W., 1983. Principles of Animal Physiology 3rd Ed.,
5. Prosser, C.L. Brown 1985. Comparative Animal Physiology, Satish Book Enterprise, Agra - 282 003.

VI SEMESTER

PAPER VIII

ENVIRONMENTAL BIOLOGY AND EVOLUTION

Objectives :

To realize the importance of inter relationship between every organism and environment.

To study the impact of eco factors on the morphology & distribution of organisms.

To study, the theories of evolution.

UNIT-I

Scope-concept-Branches in ecology-Autecology , Synecology Micro and macro environment - Types of media and substratum and their influences on animals - Biosphere - Hydrosphere - Lithosphere - Atmosphere.

UNIT-II

Water: Properties, Forms of water, Soft and hard water. Air composition - Properties. Substratum: Soil: types - soil formation, soil group of India, soil profile.

Temperature: Distribution of temperature, Thermal stratification - Temperature as a Limiting Factor, Thermal Adaptations. Light as a limiting factor. Pressure, Gravity, Moisture and Humidity. Leibig's law Minimum – Shelford's law of Tolerance. Biogeo chemical cycles - Gaseous cycle(N2) Sedimentary cycle. (Phosphates) Intra specific and inter specific Animal association : colony formation, social organization, predation, parasitism, commensalisms, mutualism, inter specific competition - competitive principle or Gause's principle.

UNIT-III

Population: Definition - characteristics - Natality mortality, age distribution, population growth Forms, population fluctuation. Community

Ecotone and edge effects – ecological succession.

Conservation - wild life management: preservation – laws enforced – sanctuaries, national parks.

Natural resources management: renewable and non-renewable

UNIT-IV

Environmental degradation - deforestation, urbanization, population explosion and other environmental hazards - depleting natural resources and relationship between poverty and environmental degradation and vice versa. Environmental ethics and laws - Earth summits – role of governmental agencies for environmental monitoring.

UNIT-V : EVOLUTION

Theories of Lamarck, Darwin and Devries – Modern concept of natural selection – Variation – isolation – speciation – living fossils – Evolution of man-biological and cultural. Distribution of animals – Zoogeographical realms.

References :

1. Kotpal, R.L. and N.P. Bali, 1986. Concepts of Ecology, Vishal Publications, New Delhi - 7.
2. Rastogi V.B. and M.S. Jayaraji, 1988-1989. Animal Ecology and Distribution of animals, Kedar Nath, Ram Nath Meerut – 250 001.
3. Clark, G.L. 1954, Elements of Eology, John Wiley & Sons Inc., New York, London.
4. Ananthakrishnn, T.N. and S. Viswanthan, Principles of Animal Ecology.
5. Eugene P. Odum, 1971. Fundamentals of Ecology, Saunders International Student Edition, W.B. Saunders company, Philadelphia London, Toronto.
6. Verma, P.S and Agarwal 1986, Environmental Biology, S. Chand & Co Ltd.,
7. Richard, Manual of Wild life Conservation.
8. Organic Evolution Veer Bala Rastogi, Publications Meerut.

PAPER IX

ECONOMIC ZOOLOGY

Objectives :

To encourage young learners to take up the small scale industries

To generate motivation for Self-Employment

To disseminate information on economic aspects of Zoology

To inculcate knowledge on useful animals to Mankind

To satisfy the learners with modern techniques of Animal culture

UNIT-I

A) Vermiculture and Composting

Economic Entomology: Useful Insects of commercial values,

B)Apiculture – Species of Honeybees – Honey extraction – Economics of Apiculture and management.

C) Sericulture – Nature and economic importance of Sericulture in India

UNIT-II

Economics of aquaculture-

A] Pisciculture – Techniques of induced breeding Commercial culture of catla & cat fish By-Products of Fishing and its commercial values.

B]Prawn culture -Culture techniques of fresh water (Macrobrachium rosembergii) & Marine water (Penaeus monodon) preservation – processing and export techniques adopted in Prawn fishiery.

C]Pearl culture: Formation and nature of Pearls – Commercial importance of Pearl Culture in India.

UNIT-III

Economics of Poultry keeping: Morphology of different breeds of Chicken-Brooding and Rearing of Chicks-Processing of Egg, Meat and By-Products of Poultry.

UNIT-IV :

A]: Dairy farm management, Milch breeds. Draught breeds, Dual purpose breeds and New Cross breeds of Cows and Buffaloes in India.

B]: Sheep farming: Indigenous and Exotic breeds of Sheep.

UNIT-V

Future strategies for Livestock Development – Transgenic Animal Technology – Genetic Improvement for best breeds - Economic importance of Dairy, Leather, Wool, Fur and Pharmaceutical Industries in India.

References :

1. Sukla, G.S. and Upadhyay, V.B., 2000
   Economic Zoology – ISBN – 81-7133-137-8
   Rastogi Publications, Meerut, India.
2. Jawaid Ahsan and Subhas Prasad Sinha, 2000
   A Handbook on Economic Zoology-ISBN-81-219-0876-O
   S. Chand & Co., Ltd., New Delhi.
3. Ashok Kumar and Prem mohan Nigam, 1991
   Economic and Applied Entomology
   Emkay Publications, New Delhi.
4. Shammi, Q.J. and Bhatnagar, S., 2002
   Applied Fisheries: ISBN-81-7754-114-5
   Agrobios (India), Jodhpur – India.
5. Major Hall, C.B. 2005
   Ponds and Fish culture - ISBN-81-7754-146-3
   Agrobios (India), Jodhpur – India.
6. Keith Wilson, N.D.P., 2005
   A Handbook of Poultry Practice – ISBN-81-7754-O-69-6
   Agrobios (India), Jodhpur – India.
7. Banerjee, G.C. 1992
   Poultry – III- Edition – ISBN-81-204-008-4
   Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

8. Banerjee, 1988
A Text Book of Animal husbandry-VIII-Edition-ISBN-81-204-1260-5
Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
9. Kaushish, S.K., 2001
Trends in Livestock Research – ISBN-81-7754-112-9
Agrobios (India), Jodhpur – India.
10.Ismail, S.A. 1997. Vermicology the Biology of Earth worm Orient Longman, India
11. A. Mary violet Christy 2008 vermy technology MJP Publ. Chennai

CORE PRACTICAL III

ANIMAL PHYSIOLOGY, IMMUNOLOGY AND DEVELOPMENT BIOLOGY

A. ANIMAL PHYSIOLOGY

1. Study of human salivary amylase in relation to either pH and Temperature.
2. Estimation of Oxygen consumption in a fish with reference to body weight.
3. Detection of nitrotgenous waste products in fish tank water. Frog tank water, Bird excreta and mammalian Urine/Kidney.
4. Use of Kymograph unit, B.P. apparatus, Stethoscope.

B. IMMUNOLOGY

1. Study of Antigen-Antibody reaction-Human blood grouping (ABO and Rh)
2. Study of prepared slides of histology:
   a) Thymus
   b) Spleen
   c) Bone marrow
   d) Lymph node.

C. DEVELOPMENT BIOLOGY

Study of the following prepared slides/museum specimens

1. Sections of Testis and Ovary (Mammalian)
2. Slides of Mammalian sperm and ovum.
3. Study of Egg types-Frog's egg, Hen's egg.
4. Study of cleavage stages – Blastula and gastrula of frog.
5. Slides of different stages of chick embryo-18 Hours (Primitive streak stage), 24 hours, 48 hours and 96 hours.
6. P17acenta of Sheep, Pig and Man

CORE PRACTICAL IV

ENVIRONMENTAL BIOLOGY AND ECONOMIC ZOOLOGY

1. ENVIRONMENTAL BIOLOGY

1. Estimation of Dissolved oxygen, Salinity, pH, free CO2, carbonate and Bicarbonates in water samples.
2. Use of Rain gauge, Maximum and minimum thermometer, Hygrometer and Anemometer.
3. Plankton study - Fresh water and Marine plankton.
4. Study of natural ecosystem and field report.

2. ECONOMIC ZOOLOGY PRACTICALS

Study of the following prepared slides/specimens

Earthworm types (any two) - (vermiculture)

Megascolex mauritii - South Indian species - surface crawlers

Drawida modesta - Redsoil with calciferous gland

Pheretima posthuma - North Indian - Large specimen

Eudrilus engenia-Redworm, Exotic.

Fish parasites (Lernea, Argulus)

Larvivorous fishes

Poecelia reticulate - Guppy

Gambusia affinis - Gambusi

Colisa labia - Dwarfgourami

Different stages of silk worm

Types of bees

Common pests.

ELECTIVE

1. BIOCHEMISTRY

Objective :

To define and explain the basic principles of biochemistry

UNIT-I

Aqueous solutions – properties of water – hydrogen ion concentration acids, bases and their concept-buffers and electrolytes and their functions-acidity, alkalinity and pH determination.

UNIT-II

Bioenergetics-energy and its forms-free energy-laws of thermodynamics-enthalpy and entropy-redox potential-redox coupling and ATP bioenergetics.

UNIT-II

Biochemistry of carbohydrates, lipids, protein (structural, catalytic)-primary, secondary, tertiary and quaternary structure and characteristics of proteins vitamins types-source & deficiency

UNIT-IV

Enzymes : classification and nomenclature of enzymes – physico-chemical-properties of enzymes-enzyme kinetics-mechanism of enzyme action-factors affecting enzyme activity.

UNIT-V

A brief account on the Biochemistry of Antibiotics & their mode of action. Fractionation of biological materials by chromatography (PC, TLC) electrophoresis (Principle & types) centrifugation (principle & types).

Reference :

1. L.Stryer, 1999 Biochemistry IV Edition. Freeman Company, New York.

2. Lehninger, 1992 Biochemistry worth Publications Inc., CBS Publication, New Delhi

3. H.S. Srivastava Elements of Bio Chemistry, Rostogi Publications.

4. Outline of Biochemistry, Corn & Stump.

5. Veerakumari.L, 2004, Bio chemistry, MJP publications.

6. G.P. Talwar & L.M. Srivastava, 2003 Text Book of Bio chemistry and Human Biology Eastern Economy Edition, Prentice Hall of India, New Delhi.

ELECTIVE

2. BIO INSTRUMENTATION

Objective :

To acquire the knowledge of basic principles and applications of tools. To know the techniques for the measurement of physical, physiological, biochemical and biological factors in man and other living organism.

UNIT-I

Units of measurements – Metric system, conversion of units, Microscopy – principles & types (simple, light, phase contrast, polarizing darkfield & Electron) Autoclave – principle & applications and types

UNIT-II

Centrifuge – principles & types (clinical, ultra centrifuges) pH-Sorenson's pH scale, pH meter-principle and applications. Manometry, Warburg manometer – principle & working

UNIT-III

Chromatrography – principles types (paper, Thinlayer, column) and applications; Electrophoresis-principles, types-paper & gel (AGE & PAGE) and applications.

UNIT-IV

Spectoscopy – principles & uses of colorimetry and NMR (Nuclear Magnetic Resonance) spectroscopy; Radio isotopic technique – Radio immuno assay, Biochemical applications of radio isotopes.

UNIT-V

Biosensors, principle, - types (Enzyme, Bacterial electrodes, Environmental Bio sensors & Bioreporters & applications) DNA & RNA sequencing methods, PCR – principle & application. DNA Micro array and its applications.

References :

1. Veerakumari L., 2006. Protein sequencing in Bio informatics Bioinstrumentation, MJP publ. Chennai.
2. W.W. unbriet, Z.H. Burri and Stamffier J.F. Manometric and Biochemical techniques, 5th Ed. Burges Pub. Co. Minneapolis 1972
3. Biophysics : Ani-introduction, R.M.J Cottenill John Wiley & Sons Ltd., England 2002.
4. M.A. subramanian 2005, Biophysics (Principles and Techniques) MJP Publishers, Chennai
5. A. Upadhyaya, K. Upathyaya and N. Nath, (2003) Biophysical chemistry, Principles and Techniques, 3rd Ed, Himalaya publishing house.
6. H.B. Bull, F.H. Davis, An introduction to physical Biochemisty 2nd Ed,Philadelphia 1971
7. Gurumani.N. 2006. Reasearch methodology for Biological sciences MJP publ. Chennai.

ELECTIVE

3. NANOTECHNOLOGY IN LIFE SCIENCES

Objectives :

To impart current knowledge in Nanotechnology

To create Fundamental understanding of usage of Nanomaterial in Life Science.

UNIT-I

Scope-Fundamental understanding of Concepts and Methods of Nanotechnology. Overview on Nanotechnology and Interdisciplinary field.

UNIT-II

Basic and Structural Nanotechnology. Molecular and Macromolecular levels – Nanoscales - devices and systems developed in Nanotechnology.

UNIT-III

Nanotechnology adopted in DNA computing, Molecular Nanotechnology, Quantum Nanotechnology, Optical and Particles used in Nanotechnology.

UNIT-IV

Use Carbon nanotubules, Better and Cheaper nanomaterials-Evaluation of nanomaterials and nanosystems by using conventional materials.

UNIT-V

Applications of nanotechnology in the fields of Agriculture, Medicine. Future perspectives of Nanotechnology in Life Sciences.

References :

1. Shanmugam, S.2009: Nanotechnology, MJP-Publ. Chennai-India
2. Kumar, U. 2008: Nanotechnology-A Fundamental Approach-Agrobios-India.
3. Ratner, 2008 : Nanotechnology – A Gentle Introduction to next big idea Tamilnadu Book House, Chennai-Inida
4. Goodshell, D.S. 2004-Biotechnology: Lessons from Nature-John Wiley & Sons (Asla) Publ. Ltd., Singapore.

ELECTIVE

4. APPLIED ENTOMOLOGY

Objective :

To study the insect species causing damage to the crops in the field as well as under storage condition and the effective control measures against them.

UNIT-I

Types of pests – types of damage caused by pests in crops – causes for insects assuming pest status – outbreak of pests.

UNIT-II

Pests of agricultural importance, their bionomics, life cycle and control measures of paddy, ground nut, cotton, Tomato coffee & Banana

UNIT-III

Pests of stored products and their control-Household pests – cockroach and termities-and their control – pests in relation to public health-Rodents and their control

UNIT-IV

Pest control methods and applications : cultural, mechanical, Biological and chemical methods – classification of pesticides – LC 50 and LD 50 values – First Aid & precautions in handling pesticides – Pesticide spraying appliances.

UNIT-V

Pesticide industry – production and marketing – recent trends in pest control-pheromones, attractants, Repellants and Chemosterilants Integrated pest management, its importance & applications.

References :

1. Vasantharaj David and T. Kumaraswami 1988. Elements of Economic Entomology. Popular book depot, Chennai.
2. Nayar, K.K., Ananthakrishnan, T.N. and B.V. David 1992 General and Applied Entomology Tata McGraw, New Delhi.
3. P.G. Fenemore, Alka prakash 1997 Allied Entomology, Wiley Eastern Ltd., New York.
4. Wiggles worth J.B., 1994. Insect physiology, Chapman and Hall, London.
5. Temphare D.B., 1984. A. Text Book of Insects Morphology, Physiology and Endocrinology. S. Chand and Co., New Delhi.

ELECTIVE

5. HUMAN ENDOCRINOLOGY

Objective :

To learn about the hormonal regulations and their defects in Man.

UNIT-I

Classification and characteristic features of Hormones

Structure of Hypothalamus and pituitary Gland – Hormones of pituitary Gland Adenohypophysis or Anterior Lobe of pituitary Gland

Pars Intermedia or Middle Lobe of pituitary Gland

Neurohypophysis or posterior Lobe of pituitary Gland

Hypothalamic Regulation for Release of pituitary Hormones.

UNIT-I

Structure of Thyroid Gland – Biosynthesis of Thyroid Hormones

Biological functions of Thyroxine , Regulation of Thyroid Secretion

Thyroid Dysfunction-parathyroid Glands

Biological Action of parathyroid Hormones – parathyroid Dysfunction.

UNIT-III

Structural features – Hormones of Adrenal Cortex

Biological Action of Adrenalilne and Noradrenaline – Emergency Hormones.

UNIT-IV

Islets of Langerhans – Insulin-Biosynthesis of Insulin-

Regulation of the secretion of Insulin-Biological Action of Insulin

Mechanism of Action of Insulin

UNIT-V

Male Reproductive system – Hormonal control of Testes

Chemistry and Biosynthesis of Testosterone – Functions of Testosterone

Female Reproductive system-Role of Hormones in Female Sexual cycle

Placental Hormones – parturition-Lactation.

References :

1. Mac E Hadley, 1992 Endocrinology, Third edition, prentice Hall, New Jersy
2. Matsumoto A. and Ishi S., 1992 (eds). Atlas of endocrine organs, vertebrates and Invertebrates springier verlag, Germany
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5. Turner, C.D and Bagnarr, J.T., 1094, General Endocrinology, 6th Edition, WB Saunder's company, Philadelphia (Saunder's International Students edition)
6. Lamming, G.E. 1984. Marshall's physiology of Reproduction ; Reproductive cycles of vertebrates. Churchill livingstone, Edinburgh.
7. Prakash S Lohar Endocrinology, Hormones and Human Health.

ELECTIVE

6. MICROBIOLOGY

Objectives :

To emphasize the importance of integrating new knowledge on Microorganisms.

To update the Technological innovations of Microbial Genetics and its Applications.

UNIT-I

The scope of Microbiology – Characterization, Classification and identification of Microorganisms.

UNIT-II

The World of Bacteria – General morphology and classification of Gram-positive and Gram-negative Bacteria.

UNIT-III

The World of other Microorganisms – General morphology of Fungi – Molds and Yeasts, Algae, Protozoa and Viruses.

UNIT-IV

Epidemiology of infectious diseases with reference of Human-such as Bacterial [Tuberculosis],Viral[Hepatitis], Protozoan [Amoebiasis]and Fungal[any one]diseases-Host. Microbe interactions-Immune Responses-Antibiotics and other Chemotherapeutic agents.

UNIT-V

Applied Microbiology in the fields of Food, Agriculture, Industry and Environment.

References :

1. Mani,A., Selvaraj, A.M., Narayanan, L.M. & Arumugam, N. 1996 : Microbiology – saras publications – Nagercoil-India.
2. Sharma, P.D. 1998: Microbiology – Rastogi Publ. Meerut, India
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7. Vijaya Ramesh, 2005: Environmental Microbiology, MJP.Publ., Chennai, India
8. Vijaya Ramesh, 2007: Food Microbiology, MJP.Publ. Chennai, India.
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11. Purohit, S.S. 2007: Microbiology - Agrobios Publ. India
12. Trivedi, P.C.2008: Applied Microbiology - Agrobios Publ. India
13. Prescott, 2009: Industrial Microbiology - Agrobios Publ. India
14. Parihar, L. 2008: Advances in Applied Microbiology - Agrobios Publ. India
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16. Bohra, A. 2006: Food Microbiology, Agrobios Publ. India

SKILLED BASED ELECTIVE SUBJECT

1. PUBLIC HEALTH AND HYGIENE

Objectives :

To impart awareness on Public Health and Hygiene

To create knowledge on Health Education.

UNIT-I

Scope of Public health and Hygiene – nutrition and health – classification of foods – Nutritional deficiencies - Vitamin deficiencies.

UNIT-II

Environment and Health hazards – Environmental degradation – Pollution and associated health hazards.

UNIT-III

Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plauge, Leprosy and AIDS.

UNIT-IV

Non-Communicable diseases and their preventive measures such as Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.

UNIT-V

Health Education in India – WHO Programmes – Government and Voluntary Organizations and their health services – Precautions, First Aid and awareness on sporadic diseases.

References :

1. Park and Park, 1995: Text Book of Preventive and Social Medicine – Banarsidas Bhanot Publ. Jodhpur – India.

2. Verma, S. 1998 : Medical Zoology, Rastogi publ. – Meerut – India

3. Singh, H.S. and Rastogi, P. 2009 : Parasitology, Rastogi Publ. India

4. Dubey, R.C and Maheswari, D.K. 2007 : Text Book of Microbiology – S. Chand & Co. Publ. New Delhi – India.

SKILL BASED ELECTIVE SUBJECT

2. BIOFERTILLIZER PRODUCTION

Objectives :

To impart awareness on Bio fertilizer Technology

To create knowledge on Environmental degradation.

UNIT-I

Scope of Bio fertilizers – Types of soil – Physical and Chemical composition of Soil. Types of microorganisms in soil.

UNIT-II

Production of Bacterial bio fertilizers – Mass production and utilization of different strains of Cyanobacteria. Mass cultivation of Azolla and its utilization.

UNIT-III

Isolation and identification of Endophytic nitrogen fixers. Rhizobium and Legume root nodulation and nitrification process.

UNIT-IV

Production of Micorrhizal bio fertilizer – Phosphate solublising microorganisms – VAM – Vesicular Arbuscular Mycorrhizal Fungi and its applications as bio fertilzers.

UNIT-V

Use of Composite Bio fertilizers – Methods for enhancing soil fertility. Renewable properties of bio fertilizers. The cost / benefit analysis of production and application of bio fertilizers.

References :

1. Singh,T. and Purohit,S.S. 2008: Bio fertilizer technology, Agrobio – India

2. Sharma,A.K. 2007 : Bio fertilizer for sustainable Agriculture – Agrobios-India.

3.Pandiyarajan,P. 2008 : Techniques in Agricultural Microbiology-Agrobios-India

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SKILL BASED ELECTIVE SUBJECT

3. APICULTURE

Objective :

Entrepreneur motivation for practicing Apiculture as cottage Industry.

UNIT-I

History – Biology and classification of honey bee species of honey bees

Social organization of honey bee colony.

UNIT-II

Bee hive – Flora for apiculture – Selection of bees for apiculture, Method of bee Keeping – Indigenous method of Extraction of honey

UNIT-III

Modern method of apiculture – Appliances for modern method

Diseases of Honey bee and control measures.

UNIT-IV

Products of bee keeping : Honey – Bee wax and Bee Yeman – Honey :

Production, Chemical composition – Economic importance of Honey bee wax.

UNIT-V

Bee enemies – Bee keeping industry – Recent efforts – Modern method in employing honey bees for cross pollination in horticultural gardens.

References :

1.M.S. Nalina Sundari 2006,Entomology M.J.P publications , Chennai.

2. Sardar Singh, Bee keeping in India

3. Sharma .P.L., & Singh S. Hand Book of Bee keeping.

4. Honey – A comprehensive survey – International Bee Research Association for house – CNRC (England)

5. Roger. A. Morse, 1990. The ABC & XYZ of Bee culture, 40th ed., A.I Root & Co., Medina, ohio 44256. 516 pp.

SKILL BASED ELECTIVE SUBJECT

4. PISCICULTURE

Objective :

To introduce basic knowledge of Fish culturing methods and techniques.

UNIT-I

Scope of Aquaculture. Importance of cultivable fresh water, marine ornamental species.

UNIT- II

Fish farm Maintenance – Farm management technique, water quality, temperature and accessories in Farm management viz Aerator, Filter, paddler

UNIT-III

Fish culture technique, Manoculture, Polyculture and monosex culture, Induced fish breeding, Integrated fish farming

UNIT-IV

Fish nutrition and fish formulations live fish live fish transport.

UNIT-V

Prevention and control of fish diseases.

References :

1. Jhingran V.G. 1985, fish & Fisheries of India, Hindustan publishing co. New Delhi 666 pp

2. Trivedi K.K (Ed) 1986 Fisheries Devt. 2000 AD. Association of India fisheries Industries, Oxford & IBH, New Delhi 268PP

SKILL BASED ELECTIVE SUBJECT

5. INDUSTRIAL FISHERY MANAGEMENT

Objectives :

To introduce basic knowledge of Industrial fishery management & export practices.

To realize the need for augmenting food production from aquatic resources.

UNIT-I

Scope of fisheries, Export potential

UNIT-II

Preservation technique. Chilling, Freezing curing – Drying, Salting, smoking and canning.

UNIT-III

Fish spoilage – causes and remedy. Fish handling, hygiene & fish transport

UNIT-IV

Quality control & Bacterial count, pre requisites and inspection unit

UNIT-V

General Unit management – visit to a processing unit

References :

1. Bal D.V. & K. V. Rao, 1984. Marine Fisheries. Tata McGraw Hill, New Delhi 470PP.
2. Bardah, Ryther & McLarrey, 1972. Aquaculture, John wiley, New York, 868 pp.
3. Shaperd & Bromage, 1988, Intensive ship farming, BSP, professional Books, London, 404 10P

4. David cushing, 1979, Fisheries Resources of the sea & their Managements, OUP & ELBS Edition, London 87PP.
5. Proceedings of the seminar on small scale fisheries, 1981. CMFRI Bulletin No.30A.

SKILL BASED ELECTIVE SUBJECT

6. MEDICAL LAB TECHNIQUES

Objectives :

To impart awareness on Clinical Lab Technology

To create knowledge on Self-Employment Opportunity

UNIT-I

Scope of Medical Lab Technology – General procedures – Cleaning, Sterilization and Disposal of infected materials. First Aid in Laboratories.

UNIT-II

HAEMATOLOGY : Blood collection and Preservation – Blood cell countings of RBC and WBC. Heamoglobin estimation, Blood sugar estimation. Basic principles of Blood transfusions.

UNIT-III

Bacteria, Virus, Protozoa and Helminth pathogens – Clinical diagnosis of diseases such as Typhoid, Cholera, Tuberculousis, Polio, Measles, Amoebiasis and Filarisis.

UNIT-IV

Estimation of Urea, Glucose, Bile salts and Bile pigments in Urine, Microscopic Examination and analysis of ova, cysts and occult blood in Stool.

UNIT-V

Examination of Sputum, Seminal fluid and Cerebrospinal fluid. Pregnancy test – Awareness and Responsibilities of Code of Ethics for Lab Techniciains.

References :

1. Samuel, K.M. 1992 : Notes on Clinical Lab Techniques. M.K.G. Iyyer & Sons Publ. Co., Chennai – India
2. Dubey, R.C., and Maheswari, D.K.2007 : A text Book of Microbiology. S.Chand & Co. Publ. New Delhi – India
3. Purohit, S.S. 2005 : Microbiology – Fundamentals and Applications (6th Edition) Student Edition – Jodhpur – India
4. Mukherjee, 2006 : Medical Laboratory Technology Vol. I, II & III – Tata McGraw Hill Publ. Co. Noida – India.
5. Ochei, 2000 : Medical Laboratory Science – Theory and Practice – Tata McGraw Hill Publ. Co., - Noida – India.

SKILL BASED ELECTIVE SUBJECT

7 .VEGETABLE MEAT CULTURE

Objectives :

To emphasize the importance of integrating new knowledge on Food Biotechnology.

To update the Technological innovations of edible Mushrooms and their applications in Nutrition.

UNIT – I

General Characters and Classification of Edible Mushrooms. Food Biotechnological innovations on Diets.

UNIT – II

Identification of Useful and Harmful Mushrooms. Preparations for Mushroom culture – Bed preparation – Nutrients preparation climatic conditions and parameters, Spawn preparation for Laboratory and Industrial Mushroom culture.

UNIT – III

Culture of Common Edible Mushrooms such as Agaricus comestris, Agaricus arvensis, Morechella esculanta, Volvaria terastius.

UNIT- IV

Culture and Common Cattle Mushrooms such as Amantia rubescenes Armillaria melea, Trhcholoma equesture

UNIT - V

Nutritive values of Edible Mushrooms – Chemical Compositions – Carbohydrate, Proteins, Lipids, Vitamins and Organic acids, contents to Edible Mushrooms - Nutrient supplements for Human consumption as Vegetable Meat.

References :

1. Kumarasan, V. 2001: Biotechnology saras Publ. Nagercoil – India
2. Ranga,M.M 2005 : Animal Biotechnology, Students Edition, New Delhi, India
3. Reddy, D.V. 2006 : Principles of Animal Nutrition and Feed Technology - Oxford IBH Publ. New Delhi, India.
4. Dubey, R.C. 2006 : A Text Book of Biotechnology, S.Chand & Co., India
5. Purohit, S.S. 2005 : Biotechnology, Student Edition, New Delhi – India
6. Singh, Ritti : 2005. Modern Mushroom Cultivation – Agrobios
7. Suman, B.C. 2007 : Mushroom Cultivation, Processing and uses Agrobios-India
8. Dey, S.C. 2008 : Mushroom Growing – Agrobios-India
9. Pathak, V.N. 2007 : Mushroom Production and Processing Technology – Agrobios – India
10. Sharma, V.P. 2006 : Diseases and Pests of Mushrooms Agrobios – India

SKILL BASED ELECTIVE SUBJECT

8. SINGLE CELL PROTEIN CULTURE

Objectives :

To emphasize the importance of integrating new knowledge on Food Biotechnology.

To update the Technological innovations of Microbial organisms and its Applications in Nutrition.

UNIT – I

The scope of Food Biotechnology – Characterization, Classification and Identification of Microorganisms employed in Single Cell Protein cultivation.

UNIT – II

Algal Sources of Single Cell Proteins – Culture and extraction of SCP from Spirulina maxima, chlorella species.

UNIT – III

Bacterial Sources of Single Cell Proteins – Culture and extraction of SCP from Bacillus species and Methylococcus capsulatus.

UNIT – IV

Fungal Sources of Single Cell Proteins – Culture and extraction from Yeasts such as Candida species and Saccharomyces species. Extraction from Filamentous Fungi such as Agaricus species, Aspergillus species and Penicilium species.

UNIT – V

General account on the production of SCP from Biomass and Waste Materials. Nutritive values of SCP – Dietary supplements for Human, Cattle and birds.

References :

1. Arumugam, N. 2006 : Microbiology, Saras Publ. Nagercoil – India
2. Kumarasan, V. 2001 : Biotechnology, Saras Publ. Nagercoil – India
3. Agarwal, A.K. and Parihar, P.2006 : Industrial Microbiology – Student Edition – India
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7. Krishnan, A. 2005 : Students's Dictionary of Microbiology – Student Edition –India.

NON-MAJOR ELECTIVE

1. VERMICULTURE

Objectives :

To impart training on Earthworm culture Technology

To create knowledge on Self -Employment Opportunity

UNIT-I

Earthworm classification – Morphological and Anatomical characteristics. Biology of Lampito maruitti.

UNIT-II

Vermicomposting materials and their classification. Feeding habits and food for composting worms.

UNIT-III

Vermicomposting methods such as – Small scale and Large scale pit method, heap method, window method etc., Factors affecting vermicomposting such as pH,, Moisture, Temperature etc.

UNIT-IV

Vermicomposting : General procedure in Homes. Maintenance of vermicomposting beds. Harvesting the worms. Earthworm Predators, Parasites and Pathogens.

UNIT-V

Application of Vermicomposting in Agriculture and Horticultural practices. Advantages of Vermicomposting.

References :

1. Edwards, C.A., and Bother, B. 1996 : Biology of Earthworms – Chapman Hall Publ. Co., London.
2. Ismail, S.A. 1997 : Vermitechnology – The Biology of Earthworms- Orient Longman Publ. – India.
3. Ranganathan, L.S. 2006 : Vermibiotechnology from soil health to human health – Agrobios – India.
4. Talashikar, S.C. 2008 : Earthworms in Agriculture – Agrobios – India
5. Gupta, P.K. 2008 : Vermicomposting for sustainable Agriculture (2nd Edition) – Agrobios – India.

NON-MAJOR ELECTIVE

2. SERICULTURE

Objectives :

To impart training on silk worm culture technology

To create knowledge on self employment opportunity

UNIT-I

Classification of commercial varieties of mulberry. Mulberry plantation establishment and cultivation practices.

UNIT-II

Diseases of mulberry – fungal, bacterial, viral and Nematode diseases, Deficiency diseases and their remedial measures.

UNIT-III

Silkworm rearing operations – Chawki rearing and Late age rearing techniques.

UNIT-IV

Physical and commercial characters of Cocoons. Reeling operations, Importance of by-products of Sericulture.

UNIT-V

Economics of Sericulture – Future and progress of Sericulture Industry in India. Prospects of Sericulture as Self-Employment venture.

References :

1. Ganga, G. 2003: Comprehensive Sericulture Vol-I, Moriculture – Oxford-IBH Publ. Co. India.
2. Ganga, G. 2003: Comprehensive Sericulture Vol-II, Silkworm rearing– Oxford-IBH Publ. Co. India.
3.Ganga,G, and Sulochana Chetty,J. 1997 : An Introduction to Sericulture Oxford-IBH Publ. Co. India.

NON-MAJOR ELECTIVE

3. AQUARIUM FISH KEEPING

Objectives :

To impart training on Aquarium fish keeping technology

To create knowledge on self employment opportunity

UNIT – I

The potential scope of Aquarium Fish Industry as a Cottage Industry. Exotic and Endemic species of Aquarium Fishes.

UNIT – II

Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.

UNIT – III

Food and feeding of Aquarium fishes – Use of live fish feed organisms. Preparation and composition of formulated fish feeds.

UNIT – IV

Live fish transport - Fish handling, packing and forwarding techniques.

UNIT – V

General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry.

References :

1. Jingran V.G., 1991 : Fish and Fisheries in India – Hindustan Publ. Co. New Delhi – India.
2. Shanmugam K. 1992, Fishery Biology and Aqua culture-Leo Pathipagam – Chennai – India.
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5. Hall, C.B. 2005 : Ponds and Fish culture – Agrobios – Jodhpur – India.
6. Day, F, 1978 : Fishes of India Vol. I & II, William Danisan & Sons, India.

NON-MAJOR ELECTIVE

4. POULTRY FARMING

Objectives :

To impart training on Modern Poultry Farming technology

To create knowledge on self employment opportunity

UNIT – I

External morphology of variety of Fowls such as Plymouth Rock, Light Sussex, Minorca, Rhode Island, Red and White Leghorn.

UNIT – II

Classification of Fowls based on their use : Meat type such as Broilers, Egg type such as White Leghorn and Commercial layers, Dual purpose varieties, Game and Ornamental purpose varieties.

UNIT – III

Feeding Poultry – Management of Egg Layers – Management of Broilers in large scale farms.

UNIT – IV

Poultry diseases Viral, Bacterial, Fungal, Protozoan and Parasitic Lice etc., Prevention and precautions during vaccination.

UNIT-V

Management of a modern Poultry Farms – Progressive plans to promote Poultry as a Self-Employment venture.

References :

1. Jull Morley, A. 1971 : Poultry Husbanry, Tata-McGraw Hill Publ. Co. New Delhi-India.
2. Sastry, Thomas and Singh, 1982 : Farm Animals Management and Poultry Production-Vikas Publ. Co. New Delhi – India
3. Harbans Singh and Earl. N. Moore, 1982 : Live Stock and Poultry Production – Prentice Hall India Publ. Co., New Delhi - India
4. Banarjee, G.C. 1986 : Poultry, Oxford – IBH Publ. Co. New Delhi – India

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