THIRUVALLUVAR UNIVERSITY
BACHELOR OF SCIENCE
B.Sc. ZOOLOGY
DEGREE COURSE
CBCS PATTERN
(With effect from 2017 - 2018)

The Course of Study and the Scheme of Examinations

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	6	Invertebrata	25	75	100
	III	Core Practical	Practical-1	3	0	Invertebrata and Chordata	0	0	0
4	III	Allied-1	Paper-1	4	4	One out of 3 1. Chemistry – I 2. Botany – I 3. Economic Entomology – I	25	75	100
	III	Allied Practical	Practical-1	3	0		0	0	0
5	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**20**		**125**	**375**	**500**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
6	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
7	II	English	Paper-2	4	4	English	25	75	100
8	III	Core Theory	Paper-2	6	5	Chordata	25	75	100
9	III	Core Practical	Practical-1	3	3	Invertebrata and Chordata	25	75	100
10	III	Allied-1	Paper-2	4	4	One out 3 1. Chemistry – II 2. Botany – II 3. Economic Entomology – II	25	75	100
11	III	Allied Practical	Practical-1	3	2		25	75	100
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft Skills	25	75	100
				30	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	Cell and Molecular Biology	25	75	100
17	III	Core Practical	Practical-2	3	0	Cell and Molecular Biology, Genetics and Biotechnology	0	0	0
18	III	Allied-2	Paper-3	4	4	One out of 3 1. Chemistry – I 2. Botany – I 3. Economic Entomology – I	25	75	100
	III	Allied Practical	Practical-2	3	0		0	0	0
19	IV	Skill Based Subject	Paper-1	3	3	To choose one out of 2 A. Public Health and Hygiene B. Single cell protein culture	25	75	100
20	IV	Non-Major Elective	Paper-1	2	2	To choose one out of 2 A. Vermiculture B. Poultry farming	25	75	100
				30	**20**		**150**	**450**	**600**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
21	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
22	II	English	Paper-4	6	4	English	25	75	100
23	III	Core Theory	Paper-4	3	3	Genetics and Biotechnology	25	75	100
24	III	Core Practical	Practical-2	3	3	Cell and Molecular Biology, Genetics and Biotechnology	25	75	100
25	III	Allied-2	Paper-4	4	4	One out of 3 1. Chemistry – II 2. Botany – II 3. Economic Entomology – II	25	75	100
26	III	Allied Practical	Practical-2	3	2		25	75	100
27	IV	Skill Based Subject	Paper-2	3	3	To choose one out of 2 A. Bio fertilizer production B. Apiculture	25	75	100
28	IV	Non-Major Elective	Paper-2	2	2	To choose one out of 2 A. Sericulture B. Aquarium fish keeping	25	75	100
				30	**25**		**200**	**600**	**800**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
29	III	Core Theory	Paper-5	6	5	Biostatistics and Bioinformatics	25	75	100
30	III	Core Theory	Paper-6	6	5	Developmental Biology and Immunology	25	75	100
31	III	Core Theory	Paper-7	6	5	Animal Physiology	25	75	100
32	III	Core Practical	Practical-3	3	0	Animal Physiology and Developmental Biology and Immunology	0	0	0
33	III	Core Practical	Practical-4	3	0	Environmental Biology and Economic Zoology	0	0	0
34	III	Elective I	Paper-1	3	3	To choose one out of 2 A. Bio-instrumentation B. Human Endocrinology	25	75	100
35	IV	Skill Based Subject III	Paper - 3	3	3	To choose 1 out of 2 A. Pisciculture B. Mushroom culture	25	75	100
				30	**21**		**125**	**375**	**500**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
36	III	Core Theory	Paper-8	5	5	Environmental Biology	25	75	100
37	III	Core Theory	Paper-9	5	4	Economic Zoology	25	75	100
38		Core Theory	Paper-10	5	4	Evolution	25	75	100
39	III	Core Practical	Practical-3	3	3	Animal Physiology and Developmental Biology and Immunology	25	75	100
40	III	Core Practical	Practical-4	3	3	Environmental Biology and Economic Zoology	25	75	100
41	III	Elective	Paper-2	3	3	To choose one out of 2 A. Biochemistry B. Applied Entomology	25	75	100
42	III	Elective	Paper-3	3	3	To choose one out 2 A. Nanotechnology in life sciences B. Microbiology	25	75	100
43	IV	Skill based Subject	Paper-4	3	3	To choose one out of 2 A. Medical Lab Techniques B. Industrial fishery management	25	75	100
44	V	Extension Activities		0	1		25	75	100
		TOTAL		**30**	**29**		**225**	**675**	**900**

Part	Subject	Papers	Credit	Total credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	4	8	100	200
	Allied (Even Semester)	2	4	8	100	200
	Allied Practical	2	2	4	100	200
	Electives	3	3	9	100	300
	Core Theory	10	(3-7)	45	100	1000
	Core Practical	4	3	12	100	400
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others/NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**41**		**140**		**4100**

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SEMESTER I
PAPER – 1
INVERTEBRATA

Objectives:

To acquire wide knowledge about different kinds of animal species especially invertebrates.
To understand the systematic and functional morphology of various groups of invertebrates.
To study their economic importance, affinities and adaptations.

UNIT – I

Principles of Taxonomy – Binomial nomenclature-rules of nomenclature – classification of the animal kingdom. **PROTOZOA**: General characters and classification up to classes with examples. **Type study- paramecium,** parasitic protozoans [Entamoeba, Trypanosoma and plasmodium]

UNIT – II

PORIFERA: General characters and classification up to classes with examples. **Type study - sycon,** spicules and canal system in sponges. **COELENTERATA:** General characters and classification up to classes with examples. **Type study – Obelia,** polymorphism in coelenterates – corals and coral reefs.

UNIT – III

HELMINTHES: General characters and classification up to classes with examples.
Type study – Taenia solium. helminthes parasites (Wuchereria bancrofti, Ascaris and Faciola). **ANNELIDA**: General characters and classification up to classes with examples.
Type study: **Nereis,** metamerism in Annelids, parasitic adaptations of Leech.

UNIT – IV

ARTHROPODA: General characters and classification up to classes with examples.
Type study – Prawn, Peripatus and its affinities, Mouth parts of insects.

UNIT – V

MOLLUSCA: General characters and classification up to classes with examples.
Type study – Fresh water Mussel, Economic importance of mollusca.
ECHINODERMATA: General characters and classification up to classes with examples.
Type Study- Sea star, Echinoderm larvae and their significance.

Reference Books:

Ekambaranatha Ayyar.M. and T.N. Ananthakrishnan, 1992. Manual of Zoology Vol.1 [Invertebrata],
Viswanathan [Printers and Publishers] Pvt. Ltd.; Madras.
Jordan, E.L. and P.S.Verma, 1993. Invertebrate Zoology, 12th Edition. S.Chand and Co.Ltd., NewDelhi.
Kotpal, R.L. 1988-1992 Protozoa, Porifera, Coelenterata, Helminthes, Annelida, Arthropoda,Mollusca, Echinodermata. Rastogi Publications, Meerut.
Parker and Haswell, 1964. Test Book of Zoology. Vol.1 [Invertebrata]. A.Z.T; B.S.Publishers and distributors, New Delhi.
L.A Borradile and F.A.Pott. The Invertebrates. Cambridge University Press. UK.
Adam Sedgwick. 1972 A student text book of Zoology. Vol.I and II. Central book Depot. Allahabad.
P.S.Dhami and J.K.Dhami. Invertebrate Zoology, S.Chand and Co. New Delhi.
Hyman L.H. The Invertebrate Vol.I-IV. 1955, McGraw Hill Co. New York.
Barrington, E.J.W. 1969. Invertebrate structure and function. ELBS Publication.
Barnes. Invertebrate Zoology. Toppan International Co.

SEMESTER II

PAPER – 2 CHORDATA

Objectives:

To acquire wide knowledge about different kinds of animal species especially vertebrates.
To understand the systematic and functional morphology of various groups of chordates.
To study their affinities and adaptations to different modes of life.

UNIT – I

Salient Features and General classification of Phylum chordata upto orders.

Origin of Chordata.- Sub phylum: Prochordata: **Type study**: **Amphioxus** (Cephalochordata) - General Characters and affinities of Hemichordata- **Balanoglossus** & Urochordata- **Ascidian.**

UNIT –II

Class PISCES General characters and classification up to orders. **Type study: Shark.** Accessory respiratory organs in fishes. **-Class AMPHIBIA** General characters and classification up to orders. **Type study** : **Frog -** Adaptive features of Anura, Urodela & Apoda. Parental care in Amphibia - Neoteny

UNIT – III

Class REPTILIA- General characters and classification upto orders. **Type study** – **Calotes.** Poison apparatus and biting mechanism of poisonous snakes. Identification of poisonous and non – poisonous snakes.

UNIT – IV

Class AVES - General characters and classification upto orders. **Type study** – **Pigeon** Characters of Archaeopteryx, Ratitae, Migration in birds, Flight adaptation.

UNIT – V

MAMMALIA - General characters and classification upto orders. **Type study** – **Rabbit.** Egg laying mammals. Dentition in mammals. Aquatic mammals.

Reference Books:

Ekambaranatha Ayyar, M and T.N Anantha Krishnan 1992, A manual of zoology Vol. II [Chordata].
S. Viswanathan [Printers and publishers] Pvt. Ltd., Madras.
Jordan E. L. and P.S. Verma 1995. Chordate Zoology and elements of Animal Physiology. S. Chand and co., New Delhi.
Kotpal R.L. 1992. Vertebrata, Rastogi publication, Meerut.
Nigam. H.C 1983 Zoology of chordates, Vishal publications, Jalandhar.
Waterman, Allyn J.et al. 1971, Chordate Structure and functions, Mac. Millan and co., New York.
Jollie. M. 1968. Chordate Morphology. East west press Pvt. Ltd., New Delhi.
Hyman. L.H. Comparative vertebrate zoology. McGraw Hill co. New York.

CORE PRACTICAL – I

INVERTEBRATA AND CHORDATA

DISSECTIONS

Cockroach – Digestive and Nervous system, **Prawn** – Nervous system, **Fish** (any one) – Digestive and Arterial system

MINOR PARCTICAL

MOUNTING **-Insect Mouth parts :** Cockroach, Honey bee, House Fly and Mosquito
Prawn – Appendages, **Shark -** Placoid scales, **Earthworm** – Body setae

SPOTTERS

Study of the following specimens

1.Classify by giving reasons

Paramecium,Sycon, Obelia, Taenia solium, Neries, Prawn, Freshwater mussel, Seastar Amphioxus, Shark, Hyla, Rhacophorus, Calotes, Pigeon, Rat/Rabbit.

2.Adaptations to their respective modes of life

Entamoeba, Trypanosoma, Plasmodium, Corals [any 2], Ascaris, Fasiola, Wuchereria bancrofti, Cheatopterus, Leech, Limulus, Nauplius, Mysis, Zoea, Balanoglossus, Ascidian, Ichthyophis, Draco, sea snake and Bat.

3.Biological significance:

Paramecium conjugation and binary fission, physalia, Trochophore Larva, Peripatus, Sacculina On Crab, Sea Anemone on Hermit Crab, Pearl Oyster, Bipinnaria Larva, Anabas, Hippocampus, Narcine, Echeneis, Arius, Exocoetus, Eel, Amblystoma, Axolotl Larva, Bufo, Cobra, Krait, Russels Viper, Echis Carinata, Turtle, Parrot, Woodpecker, King Fisher and Ant eater

4. Relate structure and function:

Sponge Spicules, Obelia Polyp, Taenia Scolex, Nereis - Parapodium, Book lungs of scorpion/Honey bee sting apparatus, Pedicellaria of Sea star, Ctenoid Scale and Quill Feather of pigeon.

5.Draw labeled sketches:

T.S. of Nereis, T.S. of Leech, Obelia medusa, T.S. of Amphioxus through Pharynx, T.S. through arm of Sea star.

6.Osteology

Skeleton - Pectoral girdles of Frog and Pigeon.,Pelvic Girdles of Frog and Pigeon.
Fore and Hind limbs of Frog and Pigeon., Synsacrum of Pigeon. **Dentition -** Dog, Rabbit and Man

Reference Books:

Verma. P.S. 2011 A Manual of Practical Zoology INVERTEBRATES Chand & Co, Ltd, Ram Nagar -New Delhi.
Verma. P.S. 2011 A Manual of Practical Zoology CHORDATES, Chand & co, Ltd. Ram Nagar – New Delhi.
Jayanpa Sinha . 2010 Advanced Practical Zoology, Books & Allied (p) Ltd. No.1. Subham Plaza IFloor, Calcutta.

SEMESTER III
PAPER – 3
CELL AND MOLECULAR BIOLOGY

Objectives:

To learn the cytological techniques, the structure and functions of various cellular components.
To understand the integrated activity of the whole cell as in mitosis, meiosis and protein synthesis.
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 -** cell fractionation, Homogenization Centrifugation, Isolation of Sub-cellular components. **Biochemical techniques** – Electrophoresis and their applications. **Cell culture techniques** and applications.

UNIT – II

Cell – Cell theory, Ultra structure of animal cell – structure, composition and functions – cell components – Plasma Membrane – Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysomes, Glyoxisomes, peroxisomes, centrioles and Mitochondria.

UNIT – III

Cytoplasm – Physical, chemical and biological properties. **Nucleus** – Ultrastructure, Composition and Function – **Chromosomes** – Giant chromosomes (Polytene and Lamp brush chromosomes).

UNIT – IV

Cell cycle and cell division – Amitosis, Mitosis and meiosis and their significance. **Cancer biology** – structure of cancer cell, carcinogenesis. **Aging** – Cell death and apoptosis.

UNIT – V

Structure and functions of DNA & types of RNA [mRNA, tRNA, rRNA]. Semi conservative replication, mechanism and enzymology of DNA replication, **Protein synthesis.**

Reference Books:

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

SKILLED BASED SUBJECT
PAPER – 1
A. PUBLIC HEALTH AND HYGIENE

Objectives:

To impart awareness on public health, Hygiene and diseases.
To educate and emphasize on preventive measures of diseases.
To create knowledge on Health Education.

UNIT – I

Scope of Public Health and Hygiene – Nutrition and health – classification of foods – Balanced Diet – malnutrition - Nutritional deficiencies – Vitamin deficiencies. Nutritional requirements of special groups.

UNIT – II

Environment and Health Hazards – Environmental degradation – pollution and associated health Hazards – Health problems due to industrializations – Hospital waste management.

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. Alcoholism and drug dependence.

UNIT – V

Health Education and Health programmes in India – WHO programmes – government and voluntary Organizations and their health service – Precautions first Aid and awareness on sporadic diseases.

Reference Books:

Park and Park, 1995: Text book of preventive and social medicine – Banarsidas Bhanot Publ. jodhpur- India.
Verma, S. 1998: Medical zoology, Rastogi Publ.- Meerut- India
Singh, H.s. and Rastogi, P. 2009: Parasitology, Rastogi Publ. India.
Dubey, R.C and Maheswari, D.K. 2007: Text Book of Microbiology – S. Chand & co. Publ. New Delhi– India.

PAPER – 1

B. SINGLE CELL PROTEIN CULTURE

Objectives:

To have knowledge and importance of **Single cell protein (SCP)** culture techniques.
To emphasize the importance of integrating new knowledge of 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 (SCP)** 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 - Candida species. Extraction from filamentous fungi - Agaricus 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.

Reference Books:

Arumugam, N. 2006: Microbiology, Saras Publ. Nagercoil – India.
Kumarasan, V. 2001: Biotechnology, Saras Publ Nagercoil – india.
Agarwal, A.K. and Parihar,P.2006: Industrial microbiology – student edition –India.
Dubey, R.C and Maheswari, D.K. 2005: A Text Book of Microbiology – S. Chand & co., New Delhi.
Rao, A.S. 1997: Introduction to Microbiology – prentice – Hall, New Delhi, New Delhi-India.
Sullia, S.B. and shantharam, S.2005: General Microbiology, Oxford IBH – Publ.. New Delhi – India.
Krishnan, A. 2005: Students Dictionary of Microbiology – Student edition – india.

NON – MAJOR ELECTIVE

PAPER – 1

A. VERMICULTURE

Objectives:

To acquire knowledge about biofertilizer
To impart training on Earthworm culture technology
To create knowledge on Self - Employment opportunity

UNIT – I

Eathworm types – Morphological and Anatomical characteristics. Biology of Lampito maruitti.

UNIT – II

Vermicompost process -Types of Vermicomposting materials. Monoculture and polyculture techniques, factors affecting vermicomposting - pH, Moisture, temperature etc.

UNIT – III

Vermicomposting methods – Small scale and large scale pit method, heap method, Wind row method and bin method.

UNIT – IV

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

UNIT – V

Nutrients availability- Application of Vermicomposting in Agriculture and Horticultural practices. Advantages of Vermicompost and **marketing.**

Reference Books:

Edwards, C.A., and Bother, B. 1996: Biology of Earthworms – Chapman Hall Publ. Co., London.
Ismail, S.A. 1997: Vermitechnology – the Biology of Earthworms – Orient Longman Publ. – India.
Ranganathan, L.S. 2006: Vermibiotechnology from soil health to Human health – Agrobios – India.
Talashikar, S.C. 2008: Earthworms in Agriculture – Agrobios - India
Gupta, P.K. 2008: Vermicomposting for sustainable agriculture [2nd edition] – Agrobios – India.

PAPER – 1

B. 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- Plymouth rock, light Sussex, Minorca, Rhode Island, Red and White Leghorn.

UNIT – II
Classification of fowls based on their use: meat type - Broilers, Egg type – white leghorn and commercial layers, Dual purpose, game and ornamental purpose varieties.

UNIT – III
Poultry feeds and its types– Management of Egg Layers – Management of Broilers in large scale farms.

UNIT – IV
Poultry diseases viral, Bacterial, fungal, Protozoan and parasitic Lice. Prevention and precautions during vaccination.

UNIT – V
Management of a modern poultry farms – Progressive plans to promote poultry as a self employment and **marketing.**

Reference Books:
Jull Morley, A. 1971: Poultry Husbandry, Tata –McGraw Hill Publ. Co New Delhi – India.
Sastry, Thomas and Singh, 1982: Farm Animals Management and Poultry production – Vikas Publ.co. New Delhi – India.
Harbans Singh and Earl.N. Moore, 1982: Live stock and poultry production – prentice hall IndiaPubl. Co., New Delhi – India.
Banarjee, G.C. 1986: poultry, Oxford – IBH publ. co., New Delhi – India.

SEMESTER IV

PAPER – 4

GENETICS AND BIOTECHNOLOGY

Objectives:

Genetics

To acquire knowledge about genetical characters.
To know the principles of genetics, pedigree analysis and population genetics.
To learn genetic studies in man and applied aspects in Genetics.

Biotechnology

To integrate biology with technology. To study the application of Genetic engineering 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. **Pedigree analysis** in human traits.

UNIT – II

Linkage and crossing over – Drosophila – Morgan's Experiments - Cytological Evidence for Crossing Over. **Sex determination and sex linkage** in Drosophila and Man. **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 – III

Mutation – chromosomal Aberrations – examples from Human.
Applied Genetics – Animal Breeding – Heterosis, Inbreeding, Out breeding, Out Crossing, Hybrid Vigour. **Population Genetics:** Hardy weinberg Law – factors affecting Hardy Weinberg Law.

BIOTECHNOLOGY

UNIT – IV

Definition – Scope and applications – isolation of DNA – cloning – Tools of Genetic Engineering – Enzymes, Linkers and Adaptors, Cloning vectors, [plasmids, pBr322, Phagel, Cosmids and phagemids]. Techniques of Genetic Engineering _ recombinant DNA Technology and gene Cloning in prokaryotes **[cDNA and Genomic Library].**

UNIT – V

Transgeneic plants and animals – DNA finger printing – gene therapy – biocensors – biochips - **Application of Recombinant DNA technology** in Medicine & Agriculture – Socio economic issues of Biotechnology in India

Reference Books:

Verma, P.S. and V.K. Agarwal, 1995 Genectis, 8th edition, S. Chand & Co, New Delhi – 110 055.580pp.

Gunther S. Stent, 1986. Molecular Genetics. Macmillan Publishing Co Inc. 773pp.

Higgins II, Best GJ and Jones J [1996] Biotechnology – Principles and application Black well
scientific Publication Oxford London.

Gupta P.K. Elements of Biotechnology [2001] Rastogi publication, Meerut.

Dubey 2006 Text Book of Biotechnology S. Chand & co. New Delhi.

Gardener. 1991. Principles of Genetics. 8th edition. John wiley & sons Inc. New York. Chichester,Brisbane, Toronto, Singapore.

Monroe. W. Strick Berger 2004 Genetics. Printice Hall of India New Delhi.

Kumar H. D.1998 A text book of Biotechnology, affiliated East West pvt. Ltd., New Delhi.

Nicholls. 2002 Genetic Engineering, Cambridge University Press. UK.

S. Gladis Helen Hepsyba and CR. Hemalatha 2009 Basic Bioinformatics MJP Publ. Chennai.

Vijayaraman, Chellammal K.S and Manikkili. P 1998. Uyiriyae Thozhilnutpam. Chimeeraa, Trichy.

CORE PRACTICAL – II

CELL AND MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY

CELL AND MOLECULAR BIOLOGY

Cytometry
Compound microscope, camera Lucida, Stage ad Ocular Micrometers

Blood Smear Preparation – Differential count of W.B.C.
Total count of RBC using Haemocytometer.
Total count of WBC using Haemocytometer.

Slide Preparation
Mounting of Buccal Epithelium.
Mitosis in onion root tip squash.
Squash preparation of Grass hopper testes.

Study of prepared slides of histology.
Columnar Epithelium, Ciliated epithelium, Glandular Epithelium. Cartilage T.S., Bone T.S., Cardiac Muscle, Striated muscle, Non Striated muscle, Neuron, Male germ cell, Female germ cell.

GENETICS
Squash preparation of Salivary glands of chironomous larva.
Male & Female identification.
Observation of common Mutants of Drosophila.
Human Blood Grouping analysis.

BIOTECHNOLOGY
Study of prepared slides, Models or specimen.
Escherichia coli, Bacteriophage, Plasmid.
Demonstration of P.C.R technique: Southern blot, Electrophoresis.
Visit to Biotechnology lab and Report – compulsory.

SKILL BASED SUBJECT
PAPER – 2
A. BIOFERTILIZER PRODUCTION

Objectives:

To impart awareness on biofertilizer technology

To create knowledge on Environmental degradation

UNIT – I

Scope and principles of Biofertilizers – Types of soil – physical and chemical composition of soil. Types of microorganisms in soil.

UNIT – II

Production of bacterial biofertilizers – 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 Biofertilizer– Phosphate solublising microorganisms – Arbuscular vesicular Mycorrhizal (VAM) fungi as biofertilizer and its applications

UNIT – V

Use of composite Biofertilizers – Methods for enhancing soil fertility. Renewable properties of biofertilizers. The cost / benefit analysis of production and application of biofertilizers.

Reference Books:

Singh,T. and Purohit, S.S. 2008: Bio fertilizer Technology, Agrobios– India

Sharma, A.K. 2007: Bio fertilizer for sustainable agriculture – Agrobios – India

Pandiyarajan, P.2008: Techniques in Agricultural Microbiology – Agrobis – Jodhpur – India.

Purohit,S.S. 2005: Microbiology – Fundamentals and Application [6th edition] student edition –Jodhpur – India.

Dubey,R.C., and Maheswari, D.K. 2007: A text book of microbiology – S. Chand & co., New Delhi,India.

PAPER – 2

B. APICULTURE

Objectives:

To acquire knowledge of honey bees and their social values.

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 – Swarming and pheromones

UNIT – II

Bee hive – Flora for apiculture – selection of Bees for apiculture, Method of bee keeping – Indigenous method of extraction of honey. Care and management of honey bee hive

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 bee venom – 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.

Reference Books:

M.S. Nalina Sundari 2006, Entomology M.J.P Publications, Chennai

Sardar singh, Bee keeping in India.

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

Honey – A Comprehensive survey – International Bee Research Association for House – CNRC [England]

Roger. A. Morse,1990. The ABC & XYZ of Bee culture, 40th ed., A.I Root & Co, Medina, Ohio 44256.516pp

NON – MAJOR ELECTIVE
PAPER – 2
A. SERICULTURE

Objectives:

To impart training on silk worm culture technology.
To create knowledge on self employment opportunity.

UNIT – I

Introduction – importance of sericulture– Mulberry plant - Classification of commercial varieties of mulberry. Mulberry plant cultivation practices.

UNIT – II

Classification and Biology of silk moth – familiar and economically import types of silkworms – life cycle study of Bombyx mori. Diseases of silk worms -– fungal, bacterial, viral and nematode diseases, deficiency diseases and their remedial measures.

UNIT – III

Tools of sericulture– cultural methods and management of mulberry silk worms - Silkworm rearing operations – Chawki rearing and late age rearing techniques.

UNIT – IV

Harvesting methods- Physical and commercial characters of cocoons. Reeling operations, importance of by – products of Sericulture.

UNIT – V

Economics of Sericulture – Future and progress of sericulture in India. Role of State and central silk board – employment opportunities - Prospects of sericulture as self Employment as cottage industry

Reference Books:

Ganga, G. 2003: comprehensive sericulture Vol-l, Moriculture – Oxford –IBH Puubl. Co. India.
Ganga, G. 2003: comprehensive sericulture Vol –II Silkworm rearing – Oxford – IBH Publ. Co. India.
Ganga, G. and Sculochana Chetty, J. 1997: An Introduction to sericulture Oxford – IBH Publ. Co. India.

PAPER – 2

B. 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.

Reference Books:
Jingran V.G., 1991: Fish and fisheries in India – Hindustan Publ. co New Delhi – India.
Shanmugam K. 1992, Fishery Biology and Aqua Culture – Leo Pathipagam – Chennai-India.
Mill Dick, 1993: Aquarium fish, DK Publ.Co,Inc. New York –USA
Yadav. 1995: Fish and fisheries, Daya publ. co., New Delhi – India
Hall, C.B. 2005: Ponds and Fish culture – Agrobios – Jodhpur – India.
Day,F. 1978: Fishes of India Vol. I & II, William Danisan & Sons, India.

SEMESTER V

PAPER – 5

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.

BIOSTATISTICS
UNIT – I

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.

UNIT – II

Measures of central tendency: mean, median and mode. Measures of Dispersion, Range, Quartile deviation, mean deviation & Standard deviation. Test of significance (t- Test).

BIOINFORMATICS
UNIT – III
Introduction – computer – types of modern computers – operating systems – applications of MS-WORD, MS.EXCEL and MS-PPT- Documentation and Presentation of Bio Statistical data– Browsers – search engines - Use of Internet, Messenger and E-mail – Basic Knowledge of Medical transcription.

UNIT- IV

Biological databases – definition – Literature databases- NCBI – Pubmed, Medline, Protein and Nucleic acid Sequence databases and their relationship – PIR, Swiss – Prot, GeneBank, DDBJ – Structural Databases – PDB, SCOP, CATH, Structural visualization tools, RasMol, Swiss PDB viewer.

UNIT – V

DNA and RNA sequencing - Pairwise sequence Alignment –Scoring Matrices - PAM and BLOSUM- statistics of alignment scored Dot Plot – local and global alignment – Database searching – FASTA and BLAST multiple sequence alignment clustal W- Phylogenetic Tress – PHYLIP.

Reference Books:

Statistics – SP Gupta 1996 S. Chand and Co., New Delhi.

Jerold H. Zar Bio Statistical analysis [2nd edition] printice Hall of International edition, 1984

[Relevant portions]

Goutham Roy. Introduction to Computing and computing lab and Cad [2002] Books and allied [pvt]ltd. Kolkata.

MS. OFFICE for Win – Microsoft office press. Developing Application with MS-OFFICE _ Christine. Solomon – Microsoft Office Press.

Developing Bioinformatics Computer Skills Cynthia Gibbs, Sheoff Publishers & Distributors Pvt.Ltd., Mumbai.

Arthur. M. Lesk, Introduction to Bioinformatics, Oxford University Press, New Delhi, 2003

Arthur. M. Lesk, Introdution to protein Structures Oxford University Press, New Delhi, 2000

Baxevanis, A and Outllette. Bioinformatics a practical guide to the analysis of genes and proteins, Willy – Intersience, Hoboken, NJ. USA 2005

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PAPER – 6

DEVELOPMENTAL BIOLOGY & IMMUNOLOGY

Objectives:
To study ontogenesis, the development of animals including parthenogenesis.
To study embryonic adaptations, human reproduction and reproductive technology in man.
To study the process of immune response and mechanism.
To understand the advances in Immunology.

DEVELOPMENTAL BIOLOGY

UNIT – I

Gametogenesis – **Fertilization** - polarity & symmetry of eggs – types of eggs – Fertilization Mechanism, Physiology & theories – parthenogenesis –Natural – artificial – Experiments on Artificial Parthenogenesis.

UNIT – II

Cleavage – Factors influencing cleavage – fate map – blastulation and gastrulation in amphioxus, frog and chick – Experimental works of speeman and Mangold- Development of brain and eye in frog.

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.

IMMUNOLOGY

UNIT- IV

Introduction - **Lymphoid organs,** cells of immune system – their role in immune response – Antigen – Antibody reaction.Types of immunity – their role in parasitic, bacterial & Viral Infection, in hyper – sensitivity and graft rejection.

UNIT – V

Immunoglobulin – types, structure, Physico chemical and biological properties – Immunoprophylaxis – Immunization schedule of children. Immuno deficiency – AIDS, Immunotechniques.

Reference Books:

Balinsky, B.L., 1981. Introduction to embryology Saundeers, Philadelphia.
Berril & Corp Developmental Biology. McGraw Hill Book Company, MC.,New York.
M.S.Jayaraj An Introduction to embryology Veer Bala Rastogi Publication.
Verma, P.S., V.K. Agarwal and Tyagi, 1995. Chordate embryology. S. Chand & co., New Delhi.
Majumdar, N.N. 1990. Text Book of Vertebrate embryology. Tata McGraw – hill Publishing company Ltd. New Delhi.
McEwen, R.S., 1969.Vertebrate Embryology. Oxford and IBH Publishing Co., New Delhi.
Jain, P.C 1998, Elements of Developmental Biology. Vishal Publication, New Delhi.
Dubey 2006 Text book of Biotechnology S. Chand and Co., New Delhi.
Roitt.I.M 2000 Essential Immunology, Blackwell Scientific Publishers.
Paul, W.E.M. 1989,Fundamental Immunology, Raven Press, New York.
Kuby. J.1999, Immunology. W. H. Free man and Co. New York.
Current protocols in Immunology – 3 Volumes 1994 Wiley Publications.
Roitt. I, Brostoff, J. and Male. D. 2002. Immunology, Mosby, New York.
Richard, A. Golds, Thomas I, Kindt & Barbara A. Osborne 2000 Kuby Immunology, Freeman and Co.New York.
Madhavee Latha. P, 2012. Text book of Immunology, S. Chand & Company.

PAPER – 7

ANIMAL PHYSIOLOGY

Objectives:

To emphasize the basic needs of macromolecules of food and their importance.
To study the basic principles of animal Physiology.
To understand the physiology of various organs and organ systems.

UNIT – I

Nutrition and Digestion

Introduction– Food requirements – Carbohydrates, proteins, fats, minerals, and vitamins. Digestive enzymes and their role in digestion – absorption and assimilation.

UNIT – II

Respiration and Circulation

Introduction – Respiratory Pigments and functions. Transport of gases [Co2 and O2] – Respiratory quotient. Circulation Types, Composition, Properties and Function 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 and Osmoionoregulation

Introduction – kinds of excretory products – Kidney - structure and Mechanism of urine formation in mammals, hormonal regulation of excretion. Kidney failure and Transplantation. Osmoionoregulation in fishes and mammals.

UNIT – IV

Neuromuscular Co-ordination

Nervous tissue – Neuron – Structure, types of neurons. Nerve impulse – Synapse – Synaptic transmission of impulses – Neurotransmitters. Muscles – Types of muscles – Muscle Proteins – Mechanism of contraction – Cori cycle – Theories of muscle contraction.

UNIT – V

Receptors and Endocrine system

Receptors – Photoreceptor – mammalian eye –structure of retina – visual pigments – physiology of vision – phonoreceptors – mammalian ear- Organ of Corti – working mechanism – phonoreception in bat.

Endocrine glands – structure, secretions and functions of endocrine glands of vertebrates – Pituitary, Hypothalamus, Thyroid, Parathyroid, Adrenal, Thymus, Islets of langherhans, Sex organs.

Reference Books:

Sambasivaiah, Kamalakara rao and Augustine chellappa 1990. A Text book of Animal physiology and ecology, S. Chand & co., Ltd., New Delhi – 110 055.
Parameswaran, Anantakrishnan and Ananta Subramanyam, 1975. Outlines of Animal Physiology, S. Viswanathan [printers & Publishers] Pvt. Ltd.
William S. Hoar, 1976. General and comparative physiology, prentice Hall of India Pvt. Ltd., New Delhi. 110 001.
Wood.D.W, 1983, Principles of Animal Physiology 3rd Ed.,
Prosser,C.L. Brown, 1985, Comparative Animal Physiology, Satish Book Enterprise, Agra – 282 003.

ELECTIVE

PAPER – 1
A. BIO-INSTRUMENTATION

OBJECTIVE:

To acquire the knowledge of basic principles and applications of biological instruments.
To know the techniques for the measurement of physical, physiological, biochemical and biological factors in man and other living organism.
To motivate the applications of biological instruments in the field of research.
To analyze the results obtained from the biological tools for the sample

UNIT – I

Introduction of biological methods and instruments. Units of measurements – metric system conversion of units, Microscopy – principles & types [simple, light, phase contrast, polarizing dark field & electron] Autoclave- principle & application and types.

UNIT – II

Centrifuge – principles & types [Clinical centrifuges]-sample preparation. **pH** – Sorenson's pH Scale, pH meter -Principle and applications. **Manometry,** Warburg Manometer – Principle & working.

UNIT – III

Chromatography – principle types [paper, Thinlayer, column] and applications, **Electrophoresis** – principles, types – paper & gel [AGE & PAGE] and applications.

UNIT – IV

Spectroscopy – principles & use of **Colorimetry and NMR** [Nuclear Magnetic resonance] spectroscopy; Radio isotopic technique – Radio Immuno assay Biochemical application of radio isotopes.

UNIT – V

Biosensors principle - types [Enzyme, Bacterial electrodes, environmental bio sensors & Bioreporters & application] DNA & RNA sequencing methods, **PCR** – Principle & application. **DNA Micro array** and its application.

Reference Books:

Veerakumari,L, 2006. Protein sequencing in bio informatics bioinstrumentation, MJP publ. Chennai.
W.W.Unbriet, Z.H. Burri and Stamffier J.F. Manometric and Biochemical techniques, 5th Ed. Burges Pub.Co. Minneapolis 1972.
Biophysics : An introduction, R.M.J Cottenill John Wiley & Sons Ltd, England.
M.A.Subramanian 2005, Biophysics (Principles and Techniques) MJP publishers, Chennai.
A.Upadhyaya, K.Upathyaya and N.Nath, (2003) Biophysical chemistry, Principles and Techniques,3rd Ed, Himamalaya publishing house.
H.B.Bull, F.H.Davis, An introduction to physical Biochemistry 2nd Ed, Philadelphia 1971.
Gurumani.N 2006. Research methodology for biological sciences MJP publ. Chennai.

B. HUMAN ENDOCRINOLOGY

Objectives:

To understand the structure and functions of endocrine glands in human.

To learn about the hormonal regulation and their defects in human.

UNIT – I

Pituitary Gland

Classification and characteristic features of hormones. Structure of hypothalamus and pituitary Gland – Hormones of Adenohypophysis, Pars intermedia and Neurohypophysis. Effects of hypo and hyper secretions - Hypothalamic regulation for release of pituitary hormones.

UNIT – II

Thyroid and Parathyroid

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

Adrenal gland

Structural features- hormones of Adrenal medulla and Cortex and their functions - Biological Action of Adrenaline and Noradrenaline – Emergency Hormones.

UNIT – IV

Islets of Langerhans

Islets of Langerhans histology – hormones Insulin and Glucogon – Biosynthesis of Insulin-Regulation and Mechanism of Action.

UNIT – V

Testes and ovaries

Male reproductive system – Hormonal control of testes Chemistry and Biosynthesis of Testosterone – functions of testosterone Female reproduction system – role of Hormones in Female sexual Cycle Placental hormones – parturition – Lactation.

Reference Books:

Mac E Hadley, 1992 Endocrinology, Third edition, prentice Hall, New Delhi Jersy

Matsumoto A. and Ishi S., 1992 [eds]. Atlas of endocrine organs, vertebrates and invertebrates springier verlag, germany.

Wilson J.D and Foster D.W 1992, William's textbook of endocrinology, 8th edition, WB saunders company, Philadelphia.

World health organization Technical report series, 1992, Oral contraceptives and Neoplasia WHO, Geneva.

Turnerm C.D and Bagnarr, J.T., 1994, General Endocrinology, 6th edition, WB saunder's company, Philadelphia [saunder's international students edition]

Lamming, G.E. 1984. Marshll,s Physiology of Reproduction; Reproductive cycles of vertebrates. Churchill livingstone, Edinburgh.

Prakash S Lohar Endocrinology, Hormones and Human Health.

SKILL BASED SUBJECT

PAPER – 3

A. PISCICULTURE

Objectives:
To introduce basic knowledge of fish culturing methods and techniques.

UNIT – I
Scope of Aquaculture. Importance of cultivable fresh water, Marine and ornamental species, maintenance of aquarium , Exotic fishes.

UNIT –II
Fish farm Maintenance – Farm management technique, water quality, temperatures and accessories in farm management viz Aerator, filter, paddler.

UNIT – III
Fish culture technique: Monoculture, Polyculture and Monosex culture, Induced fish breeding, integrated fish farming.

UNIT –IV
Fish nutrition and fish feed formulation, live fish handling and transport.

UNIT – V
Prevention and control of fish diseases.

Reference Books:
Jhingran V.G. 1985, Fish & Fisheries of India, Hindustan Publishing Co. New Delhi. 666p
Trivedi K.K [Ed] 1986 Fisheries Devt. 2000 AD. Association of India fisheries industries, Oxford & IBH, New Delhi 268pp.

PAPER – 3
B. MUSHROOM CULTURE

Objectives:
To emphasize the importance of integrating new knowledge on food biotechnology.
To update the technological innovations of edible mushrooms and their application in Nutrition.

UNIT – I
General characters and classification of Edible Mushrooms. Scope and development - Food Biotechnological innovation on diets.

UNIT – II
Identification of useful and harmful mushroom. Preparations for mushroom culture – Bed
preparation – Nutrients preparation climatic conditions and parameters, spawn preparation for laboratory and industrial Mushroom culture.

UNIT – III
Culturing methods of common Edible Mushrooms *Agaricus compestris, Agaricus bisporus, Morechella esculanta, Volvarella volvacea.* Preservation and processing of mushrooms

UNIT – IV
Nutritive values of Edible Mushrooms – Chemical compositions – Carbohydrates, proteins, Lipids, Vitamins and organic acids – Nutrient supplements for Human consumption as vegetable meat.

UNIT – V
Diseases of mushroom – Bacterial (bacterial rot, brown spot and yellow blotch) – fungal (dry bubble, wet bubble and cob web) and pest (beetles and nematodes). Marketing and self employment aspects.

Reference Books:
Kumarasan, V.2001: Biotechnology Saras Publ. Nagercoil – India
Ranga, M.M 2005; Animal Biotechnology, Students Edition, New Delhi, India.
Reddy, D.V. 2006: Principles of Animal Nutrition and Feed.
Technology – Oxford IBH Publ. New Delhi, India.
Dubey, R.C. 2006: A Text Book of Biotechnology, S. Chand & co, India.
Purohit, S.S. 2005: Biotechnology, Student edition, New Delhi – India.
Singh, Ritti: 2005: Modern Mushroom Cultivation – Agrobios.
Suman, B.C. 2007: Mushroom cultivation, Processing and uses agrobios - India
Dey, S.C.2008: Mushroom Growing – Agrobios – India.
Pathak, V.N. 2007: Mushroom Production and Processing Technology – Agrobios – india.
Sharma, V.P. 2006: Diseases and pests of mushrooms Agrobios – India.

SEMESTER VI
PAPER – 8
ENVIRONMENTAL BIOLOGY

Objectives:

To create awareness towards recent changes in the environment and preventive measures.
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.

UNIT – I

Scope – concept – Branches in ecology – Autecology, synecology - types of media and substratum and their influences on animals – **Water:** Properties, Forms of water, Soft and hard water. **Air** composition – properties. **Substratum**: Soil -Types, soil formation, soil group of India, soil profile.

UNIT – II

Biosphere – Hydrosphere – Lithosphere – Atmosphere – temperature: Distribution of temperature, thermal stratification – Temperature as a limiting factor, thermal adaptations. Light as a limiting factor. Pressure gravity, Moisture and humidity. Liebig's law minimum, Shelford's law of tolerance.

UNIT – III

Biogeochemical cycles – gaseous cycle [C,N2 & S] sedimentary cycle, [phosphates]. **Animal association** - Intra specific and inter specific - colony formation, social organization, predation, parasitism, commensalisms, mutualism, inter specific competition – competitive principle or Gause's principle.

UNIT – IV

Population: Definition – characteristics – Natality, Mortality, age distribution of 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 – V

Environmental degradation – deforestation, urbanization, population explosion and other environmental hazards – Environmental ethics and laws – Earth summits – role of governmental agencies for environmental monitoring.

Reference Books:

Kotpal. R.L, and N.P. Bali, 1986. Concepts of Ecology, Vishal Publications, New Delhi – 7
Rastogi V.B, and M.S. Jayaraji, 1988 – 1989. Animal Ecology and Distribution of animals, Kedar nath, Ram Nath Meerut – 250 001.
Clark, G.L. 1954, Elements of Eology, John wiley & Sons Inc., New York, London.
Ananthakrishnan, T.N, and S. Viswanathan, Principles of Animal Ecology.
Eugene P. Odum, 1971. Fundamentals of ecology, Saunders International Student Edition, W.B. Saunders Company, Philadelphia London, Toronto.
Verma, P.S and Agarwal 1986, Environmental Biology, S. Chand & Co Ltd.
Richard, Manual of wild life conservation.

PAPER – 9

ECONOMIC ZOOLOGY

Objecives :
To inculcate knowledge on useful animals to Mankind.
To generate motivation for self-employment.
To disseminate information on economic aspects of zoology.

UNIT – I
Vermiculture: Methods of composting.
Apiculture - Species of Honeybees –Honey extraction – Economics of Apiculture and management.
Sericulture – Nature and economic importance of sericulture in India.

UNIT –II
Prawn culture – Culture techniques of fresh water [Macrobrachium rosenbergii] & Marine water (Penaeus monodon)
Pearl culture: Formation and nature of Pearls – Commercial importance of Pearl Culture in India.
Pisciculture– Techniques of induced breeding, commercial culture of catla & catfish, By–products of fishing and its commercial values.

UNIT – III
Poultry- Morphology of different breeds of Chicken – Brooding and Rearing of Chicks – Processing of Egg, Meat and By–Products of Poultry.

UNIT – IV
Dairy farm - management, Milch breeds. Draught Breeds, Dual Purpose breeds and New cross Breeds of Cows and Buffaloes in India.
Sheep farm: 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.

Reference Books:

Sukla, G.S. and Upadhyay, V.B., 2000 Economic Zoology – ISBN – 81- 7133 -137 -8 Rastogi Publication, Meerut, India

Jawaid Ahsan and Subhas Prasad sinha – 2000 A Handbook on Economic Zoolgy - ISBN – 81 – 219- 0876 – 0 S. Chand & co., Ltd., New Delhi.

Ashok Kumar and Prem Mohan Nigam, 1991 Economic and Applied Entomology Emkay Publication, New Delhi.

Shammi,Q.J. and Bhatnagar, S., 2002 Applied Fisheries: ISBN – 81 – 7754 – 114 – 5 Agrobios [India], jodhpur - India

Major Hall, C.B. 2005 Ponds and Fish culture – ISBN – 81 – 7754- 146 – 3 Agrobios [India], jodhpur - India

Keith Wilson, N.D.P., 2005 A Handbook of Poultry Practice – ISBN – 81 – 7754 -0- 69- 6 Agrobios [India], jodhpur - India

Banerjee, G. C. 1992 Poultry – III – Edition – ISBN – 81 – 204 – 008 – 4 Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Banerjee, 1988 A text book of Animal Husbandry – VIII- Edition – ISBN – 81- 204 – 1260 -5 Oxford & IBH Publishing co. Pvt. Ltd., New Delhi.

Kaushish, S.K., 2001 Trends in livestock Research – ISBN – 81 – 7754 – 112 - 9 Agrobios [India], jodhpur - India

Ismail, S.A1997. Vermicology the Biology of Earth worm orient Longman, India.

A. Mary Violet chrishty 2008 Vermi techonology MJP Publ. Chennai.

PAPER – 10

EVOLUTION

Objectives:
To understand the concepts of origin of life.
To comprehend the scientific concepts of animal evolution through theories and evidences.

UNIT – I
Evidences: The need of evidences for the fact of evolution – Morphological, anatomical, Embryological,Physiological and Biochemical evidences.

UNIT – II
Theories: Lamarckism, Neolamarckism, Darwinism, NeoDarwinism, Devries concept of Mutation.
Modern version of Mutation theory.

UNIT – III
Natural selection: Types, stabilizing and diversifying directional selection. **Variation:** Types of variation.

UNIT-IV
Mimicry – Batesian and mullerian mimicry and evolution, living fossils. Distribution of animals.

UNIT – V
Isolation – Premating and post mating isolating mechanism, speciation. **Evolution of man** – Biological and cultural.

Reference Books:
Agarwal, V.K and Usha Gupta – Evolution and animal distribution, Chand and Co.,
Dodson,E.O. 1990. Evolution, Reinhold, Newyork.
Francisco.J.Ayla – Evolution, Surject publication.
Gopalakrishnan.T.S. Itta Sambasivaiah and A.P.Kamalakara Rao. Principles of organic Evolution,
Himalaya publishing house.
T.K.Ranganathan, Evolution. 1994 Rainbow Printers, Palayankottai.
Veer Bala Rastogi. Organic Evolution, Meerut Publications.
Arumugam.N. Organic Evolution, 2009 Saras. Publ. Nagarcoil, Kanyakumar Dt.

CORE PRACTICAL – III

BIOSTATISTICS, ANIMAL PHYSIOLOGY, DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

BIOSTATISTICS:

Biological data – calculation of mean, median, mode, Mean and standard deviation.
Graphical representation – Bar, Pie, frequency distribution.
Demonstration of MS- word, MS-Excel and MS-PPT.

ANIMAL PHYSIOLOGY:

Activity of human salivary amylase in relation to Ph, Enzyme concentrate and Temperature.
Estimation of Oxygen consumption in a fish with reference to body weight.
Detection of nitrogenous waste products in fish tank water, frog tank water, bird excreta and mammalian urine/ Kidney.
Use of Kymograph Unit, B.P. apparatus, stethoscope.

DEVELOPMENT BIOLOGY:

Study of the following prepared slides / museum specimens.
Section of testis and Ovary [Mammalian].
Slides of Mammalian sperm and ovum.
Study of Egg types – Frog's Egg, Hen's Egg.
Study of cleavage stages 2 Cell, 4Cell, 8Cell – Blastula and gastrula of Frog.
Slides of different stages of chick embryo – 18 hours [primitive streak stage], 24 hours, 48 hours 72 hours and 96 hours.
Placenta of Sheep, Pig and Man.

IMMUNOLOGY:

Study of Antigen – Antibody reaction – Human Blood grouping [ABO and Rh].
Study of prepared slides of histology: Thymus, Spleen, Bone marrow, Lymph node.

CORE PRACTICAL – IV

ENVIRONMENTAL BIOLOGY, ECONOMIC ZOOLOGY AND EVOLUTION

ENVIRONMENTAL BIOLOGY:

Estimation of Dissolved oxygen, salinity, pH, Free Co_2, Carbonate and Bicarbonates in water
samples.
Use of rain gauge, Maximum and Minimum thermometer, Hygrometer and Anemometer.
Plankton study – fresh water and Marine plankton.
Study of natural ecosystem and field report.

ECONOMIC ZOOLOGY:

Study of the following prepared slides / specimens.
Earthworm types [any two] – [vermiculture].
Megacolex mauritii – south Indian species – surface crawlers.
Drawida modesta – Redsoil with calciferous gland.
Pheretima posthuma – North Indian – Large specimen.
Eudrilus eugenia – Redworm, Exotic.
Fish parasites [Lernea, Argulus].
Larvivorous fishes :
Poecelia reticulate – Guppy.
Gambusia Affinis – Gambusi.
Colisa labia – Dwarf gowrami.
Different stage of **Silk worm.**
Types of **Bees.**
Common **Pests.**

EVOLUTION

Fossils – ammonite.
Living fossils – Limulus, sphenodon.
Conneting link – peripatus, archaeopteryx.
Evolutionary significance – exocoetus, draco, hippocampus.
Mimicry – monarch butterfly.
Camouflage – chameleon.

ELECTIVE
PAPER – 2
A. BIOCHEMISTRY

Objectives:
To study the structure of biomolecules and their importance in the life process.
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 functions – acidity, alkalinity and pH determination.

UNIT – II
Bioenergetics – energy and its forms – free energy – laws of thermodynamics – enthalpy and entropy – redox coupling and ATP bioenergetics.

UNIT – III
Classification, **metabolism** and biological significance of carbohydrates, lipids, protein– primary, secondary, tertiary and quaternary structure and characteristics of proteins, vitamin types- source & deficiency.

UNIT – IV
Enzymes: classification and nomenclature – 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 Books:
L. stryer, 1999 Biochemistry IV Edition. Freeman Company, New York
Lehninger, 1992 Biochemistry worth publication Inc., CBS Publication New Delhi.
H.S. Srivastava Elements of Bio Chemistry, Rastogi Publications.
Outline of Biochemistry, Corn & Stump.
Veerakumari.L, 2004, Bio Chemistry, MJP Publications.
G.P. Talwar & L.M. Srivastava, 2003 Text Book of Bio Chemistry and Human Biology Eastern
Economy Edition, Prentice Hall of India. New Delhi.

PAPER – 2
B. APPLIED ENTOMOLOGY

Objectives:
To create awareness towards insect borne diseases.
To study the insect species causing damage to the crops in the field as well as under storage condition and the effective control measure against them.

UNIT – I
Introduction – **economic classification of insects -** Types of pests – types of damage caused by pests in crops – causes for insects assuming pest status – outbreak of pests.

UNIT – II
Types of insect development – ametabola and metabola (hemi metabola, holometabole, paurometabola and hypermetabola) - Pests of agricultural importance, their bionomics, l ife 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 – pest in relation to public health – rodents and their control. Mosquitoe borne diseases and their control measures.

UNIT- IV
Pest control methods and application: cultural, mechanical, biological and chemical methods – classification of pesticides – LC 50 and LD 50 values – First Aid & precautions in handling pesticides – pesticide spraying appliances. Residual effects of persticides on non target organisms.

UNIT – V
Pesticide industry - production and marketing – recent treds in pest control – pheromones, attractants, repellants and chemosterilants Integrated pest management, its importance & applications.

Reference Books:
Vasantharaj David and T. Kumaraswami 1988. Elements of Economic Entomology Popular Book Depot, Chennai.
Nayar, K.K., Ananthakrishnan, T.N. and B.V. David 1992 General and Applied Entomology Tata McGraw, New Delhi.
P.G. Fenemore, Alka Prakash 1997 Allied Entomology, Wiley Eastern Ltd., New York.
Wigglesworth J.B., 1994. Insect Physiology, Chapman and Hall, London.
Temphare D.B., 1984 A. Text Book of Insects Morphology, Physiology and Endocrinology. S. Chand and Co., New Delhi.

ELECTIVE
PAPER – 3
A. NANOTECHNOLOGY IN LIFE SCIENCE

Objectives:
To impart current knowledge in Nanotechnology.
To create fundamental understanding of usage of Nanometerial 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 of carbon nanotubules, Better and cheaper nanomaterials – Evaluation of nanomaterials and nanosystems by using conventional materials.

UNIT – V
Application of nanotechnology in the fields of Agriculture, Medicine. Future perspectives of Nanotechnology in life Sciences.

Reference Books:
Shanmugam, S.2009 : Nanotechnology, MJP-Publ. Chennai – India.
Kumar,U, W008 : Nanotechnology – A Fundamental Approach – Agrobios – India
Ratner, 2008 : Nanotechnology-A Gentle Introduction to next big idea Tamilnadu Book House, Chennai – India.
Goodshell, D.S, 2004 – Biotechnology : Lessons from Nature – John Wiley & Sons (Asla) Publ.Ltd, Singappore.

PAPER – 3
B. MICROBIOLOGY

Objectives:
To emphasize the importance of integrating new knowledge on Microorganisms.
To update the Technology innovations of Microbial genetics and its Application.

UNIT – I
The scope of microbiology – characterization, classification and identification of Microorganisms.

UNIT – II
Bacteria – General morphology, and physiology – pathogenic and non – pathogenic bacteria, economic importance.

UNIT – III
Micro organisms – general morphology of Fungi – Moulds and yeasts, Algae, Protozoa and Viruses.

UNIT – IV
Epidemiology of infectious diseases with reference to Human – such as Bacterial [Tuberculosis], Viral [Hepatitis], protozoan [Amoebiasis] and Fungal [any one] diseases - Host. Microbe interaction – immune responses – Antibiotics and other Chemotherapeutic agents.

UNIT – V
Applied Microbiology in the fields of food, Agriculture, Industry and environment.

Reference Books:
Mani, A., Selvaraj, A.M, Narayanan, L.M & Arumugam, N. 1996 : Microbiology – saras publicagtions – Nagercoil – India.
Sharma,P.D 1998 : Microbiology – Rastogi Publ. Meerut, India.
Subba Rao, N.S, 1999 : Soil Microbiology, Oxford IBH Co. New Delhi, India.
Sullia, S.B. & Santharam, S. 2004 – GeneralMicrobiology, Oxford IBH, India.
Meenakumari,S. Microbial Physiology, MJB-Publ. – Chennai, India.
Purushotam Kaushik, 2005 : Microbiology – S.Chand & Co., New Delhi, India.
Vijaya Ramesh, 2005 : Environmental Microbiology, MJP.publ, Chennai, India.
Vijaya Ramesh, 2007 : Food Microbiology, MJP.Publ. Chennai, India.
Rajan,S 2007 : Medical Microbiology – MJP.Publ. Chennai, India.
Mosharaffudin, Ahmed & Basumatary 2006 : Applied Microbiology – MJP Publ. India.
Purohit, S.S.2007 : Microbiogy – Agrobios Publ. India.
Trivedi, P.C.2008 : Applied Microbiology – Agrobios Publ. India.
Prescott, 2009 : Industrial Micobiology – Agrobios Publ. India.
Parihar, L. 2008 : Advances in Applied Microbiology – Agrobios Publ. India.
Agarwal, A.K 2008 : Industrial Microbiology, AgrobiosPubl.India.
Bohra, A.2006 : Fod Microbiology, Agrobios Publ. India.

SKILL BASED SUBJECT
PAPER – 4
A. 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, Tuberculosis, Polio, Measles, Amoebiasis and Filariasis.

UNIT – IV
Biochemical Estimation of Urea, Glucose, Bile salts and Bile pigments in Urine, Microscopic Examination and analysis of ova, cyst and occult blood in stool.

UNIT – V
Clinical Examination of sputum, seminal fluid and Cerebrospinal fluid. Pregnancy test – Awareness and Responsibilities of Code of Ethics for Lab Technicians.

Reference Books:
Samuel, K.M. 1992 : Notes on Clinical Lab Techniques. M.K.G. Iyyer & Sons Publ. Co., Chennai –India.
Dubey, R.C., and Maheswari, D.K.2007; A teat book of Microbiology S. Chand and Co. Publ. NewDelhi – India.
Purohit, S.S. 2005 : Microbiology – Fundamentals and Applications [6th Edition] Student Edition –Jodhpur – India.
Mukherjee, 2006 : Medical Laboratory Technology Vol. I, II & III – Tata McGraw Hill Publ.Co., Noida– India.
Ochei, 2000 : Medical Laboratory Science – Theory and Practice – Tata McGraw Hill Publ, Co., -Noida – India.

PAPER – 4
B. INDUSTRIAL FISHERY MANAGEMENT

Objectives :
To introduce basic knowledge of industrial fishery management and export practices.
To realize the need for augmenting food production from aquatice resources.

UNIT – I
Scope of Fisheries, Commercially important Marine, Freshwater and Estuarine fishes.

UNIT – II
Fish harvesting, sorting, grading the catch, stocking in reservoirs. **Fish preservation techniques** - Chilling, Freezing, curing, drying, salting, smoking and canning Fish marketing, fish export potentialof India.

UNIT – III
Fish spoilage – causes, autolysis, rigor mortis, chemical spoilage, microbial spoilage and remedies Fish handling, hygiene and fish transport.

UNIT – IV
Quality management, pre requisites and inspection units. **Role of MPEDA** [Marine products Export Development Authority] and **IIP** (Indian Institute of Packaging).

UNIT – V
General unit management and role of **FFDA** [Fish Farmer's Development Agencies].

Reference Books:
S.K.Gupta & P.C.Gupta – 2008 General and Applied Ichthyology (Fish & Fisheries) S.Chand & Co.,Ltd., New Delhi.
N.Arumugam 2009 Aquaculture Saras Publications Nagercoil, Kanyakumari Dt.

ALLIED PAPERS

1. CHEMISTRY – I

OBJECTIVE:

- Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications wherever necessary are to be taught for I- Semester.

UNIT – I

1.1General Metallurgy - Extraction of Metals - Minerals and Ores- Difference between Minerals and Ores – Minerals of Iron, Aluminum and Copper - Ore Dressing or Concentration of Ores - Types of Ore Dressing- Froth Floatation process, Gravity separation and Magnetic separation.

1.2 Calcination, Smelting, Roasting, Fux, Slag - Definition - Reduction methods - Goldschmidt Aluminothermic process and Carbon Reduction method - Refining of Metals - Electrolytic, Van Arkel and Zone Refining.

1.3 Ores of Titanium and Cobalt - Extraction of Titanium and Cobalt.

UNIT – II

2.1 Cycloalkanes - Preparation – Wurtz reaction and Dieckmann's condensation - Properties of Cycloalkanes – Substitution and Ring opening reactions.

2.2 Polarisation - Inductive effect, Mesomeric effect and Steric effect (Acid and Base Strength).

2.3Stereoisomerism – Types - Cause of Optical Activity – Enantiomers - Diastereomers - Meso form - Optical Activity of Lactic acid and Tartaric acid - Racemisation and Resolution – Definition and Methods - Geometrical isomerism – Definition and example - Maleic and Fumaric acid – Differences.

UNIT – III

3.1 Chemical Kinetics – Rate of a reaction – Definition of Order and Molecularity – Distinction between Order and Molecularity - Derivation of First order rate equation - Half Life Period of first order reaction.

3.2 Catalysis - Catalyst - Autocatalyst - Enzyme catalyst - Promoters - Catalytic poisons – Active Centre - Differences between Homogeneous and Heterogeneous Catalysis - Industrial Applications of Catalysts.

3.3 Photochemistry – Grothus-Draper's law – Stark-Einstein's law - Quantum yield – Photosynthesis - Phosphorescence – Fluorescence.

UNIT – IV

4.1 VSEPR Theory – Hybridisation and Shapes of simple molecules BF_3, PCl_5, SF_6 and XeF_6.

4.2 Fuels – Classification of Fuels - Calorific value of Fuels – Water gas, Carbureted Water gas and Producer gas – Composition and Uses - Non-Conventional fuels - Need of Solar Energy - Applications - Biofuels – Oil gas, Natural gas and LPG – Uses.

4.3 Osmosis - Osmotic pressure - Reverse osmosis – Definition - Desalination of Sea water.

UNIT – V

5.1Nuclear Chemistry – Atomic number, Mass number - Isotopes, Isobars and Isotones – Definition and Examples - Definition of Half life period - Nuclear Binding Energy, Mass Defect and N/P ratio - Nuclear Fission and Nuclear Fusion (Elementary idea) - Applications of Radioisotopes in Medicine, Agriculture and Industries – Carbon Dating.

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking – Naphthalene – Preparation – Haworth's method – Properties – Oxidation, Reduction and Uses of Naphthalene - Structure of Naphthalene (Structural elucidation not necessary).

5.3 Conductors, Insulators, Semiconductors, N- and P- Type Semiconductors – Definitions and Examples.

ALLIED - 2

1. CHEMISTRY – II

OBJECTIVE:

- Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins, Medicinal Chemistry, Corrosion and Applications wherever necessary are to be taught for II- semester.

UNIT – I

1.1 Coordination Chemistry - Nomenclature of Coordination Compounds - Ligands, Central Metal Ion and Complex Ion – Definition and Examples – Coordination Number - Werner's Theory of Coordination Compounds - Chelates - Functions and Structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry - Fertilisers and Manures – Biofertilisers - Organic Manures and their importance - Role of NPK in plants - Preparation and Uses of Urea, Ammonium Nitrate, Potassium Nitrite 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, Gammexane and Freons.

UNIT – II

2.1 Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate.

2.2 Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.

2.3 Proteins – Definition - Classification of Proteins based on Physical properties and Biologcal functions - Primary and Secondary Structure of Proteins (Elementary Treatment only) – Composition of RNA and DNA and their Biological role - Tanning of Leather - Alum (Aluminum chloride tanning) - Vegetable tanning – Chrome Tanning.

UNIT – III

3.1 Electrochemistry - Electrolytes – Definition and Examples – Classification - Specific and Equivalent Conductance - their determination – Variation of Specific and Equivalent conductance with Dilution – Ostwald's Dilution Law and its Limitations.

3.2 Kohlrausch's Law - Determination of Dissociation Constant of weak Electrolytes using Conductance measurement - Conductometric titrations.

3.3 pH – Definition and pH determination by indicator method - Buffer solutions - Buffer action - Importance of buffers in the living systems.

UNIT – IV

4.1Paints - Components of Paint – Requisites of a Good Paint - Pigments – Classification of Pigments on the basis of Colour – Examples - Dyes – Definition – Chromophores and Auxochromes – Examples - Colour and Dyes - Classification based on Constitution and Application – Examples.

4.2 Vitamins – Definition – Classification – Water Soluble and Fat Soluble – Occurrence - Biological Activities and Deficiency Diseases caused by Vitamin A, B, C, D, E and K - Hormones – Definition and Examples – Biological Functions of Insulin and Adrenaline.

4.3 Chromatography - Principles and Applications of Column and Paper chromatography- R_f value.

UNIT – V

5.1 Drugs - Sulpha Drugs – Preparation and Uses of Sulphapyridine and Sulphadiazine - Mode of Action of Sulpha Drugs - Antibiotics - Uses of Penicillin, Chloramphenicol and Streptomycin - Drug Abuse and Their Implication - Alcohol – LSD.

5.2 Anaesthetics - General and Local Anaesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.

5.3 Electrochemical Corrosion and its Prevention – Electroplating – Applications.

ALLIED PRACTICAL

CHEMISTRY – 1

VOLUMETRIC ANALYSIS

1. Estimation of HCl – Standard sulphuric acid.
2. Estimation of Borax - Standard Sodium Carbonate.
3. Estimation of NaOH – Standard Oxalic Acid.
4. Estimation of $FeSO_4$ – Standard FAS.
5. Estimation of Oxalic acid – Standard $FeSO_4$.
6. Estimation of FAS – Standard Oxalic Acid.
7. Estimation of Oxalic acid – Standard Oxalic Acid.
8. Estimation of Fe^{2+} using Diphenylamine / N- Phenyl Anthranilic acid as indicator.

ORGANIC ANALYSIS

Systematic Analysis of Organic Compounds containing One Functional Group and Characterisation by Confirmatory Tests.

Reactions of Aromatic Aldehyde, Carbohydrates, Mono and Dicarboxylic acids, Phenol, Aromatic Primary Amine, Amide and Diamide.

REFERENCE BOOKS

- Inorganic Chemistry - P. L. Soni - Sultan Chand (2006).
- Inorganic Chemistry - B. R.. Puri, L. R. Sharma and K. C. Kallia – Milestone Publications (2013).
- Selected Topics in Inorganic Chemistry - W. U. Malik, G. D. Tuli and R. D. Madan - S. Chand Publications (2008).
- Text Book of Inorganic Chemistry – R. Gopalan, Universities Press – 2012.
- Text Book of Organic Chemistry - P. L. Soni - Sultan Chand & Sons - 2007.
- Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd – 2012.
- Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
- A Text Book of Organic Chemistry K. S. Tewari, N. K. Vishol, S. N. Mehrotra- Vikas Publishing House – 2011.
- Principles of Physical Chemistry - B. R. Puri, Sharma and Madan S. Pathania, Vishal Publishing Company – 2013.
- Text Book of Physical Chemistry - P. L. Soni, O. P. Dharmarha andU. N. Dash - Sultan Chand & Co – 2006.
- Understanding chemistry – C. N. R. Rao, Universities Press – 2011.

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ALLIED - I

BOTANY – I

UNIT-I: Cell Biology
Prokaryotic and Eukaryotic cell (plant cell)
Cell organells - Chloroplast, Mitochondrion and Nucleus.
Cell division – Mitosis.

UNIT-II: Anatomy
Tissues - Meristematic and permanent tissues. Primary and Normal Secondary thickening of Dicot stem.

UNIT-III: Bacteria and Viruses
Bacteria - General characters - shape - flagellation - Structure of E. Coil - reproduction - (Vegetative
and asexual), Economic importance. Structure of Tobaco Mosaic Virus, Bacteriophage.

UNIT-IV: Structure and Life History of
a) Chlorella and Gracilaria
b) Albugo, Penicilium and Agaricus

UNIT-V: Structure and Life History of
a) Funaria
b) Lycopodium
c) Cycas
Economic importance of Chlorella, Penicillium and Agaricus.

ALLIED - II

BOTANY – 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, 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 Tissue Culture

Physiological role of micro and macro elements their deficiency symptoms Photosynthesis - lightreaction - Calvin cycle Respiration - Glycolysis - Kreb's cycle - electron transport system. Growth hormones – Auxins. Tissue culture and its principles.

UNIT-IV: Ecology

Ecosystem - fresh water ecosystem. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses. Theories of evolution - Lamarckism, Darwinism.

ALLIED PRACTICAL
BOTANY – I & II

Description of plants in technical terms belonging to the families mentioned in the theory part.

To study the internal structure of Anatomy material, Pteridophytes and Gymnosperms.

Identification and Description of Micro Preparation materials mentioned in the theory part.

Description of experimental setup of plant physiology.

BOOKS SUGGESTED

Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.

Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.

Rev. Fr. Ignacimuthu, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.

Rao, K.N. Krishnamoorthy, K.V. and Rao. G. (1975) Ancillary Botany. S. Viswanathan Private. Ltd., Chennai.

ALLIED – 1

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

Classification of insects [Major orders]
Biology of Butterfly

UNIT – II

Beneficial insects. Mode of life, economic importance and development.
Honey bee
Silk worm (Bombyx Mori)
Silk worm [Bombyx mori] rearing
Equipment required
Rearing procedure to harvesting of cocoons.

UNIT – III

Harmful insects
An account of any three pests of :

1. Rice 2. Cotton 3. Coconut

UNIT – IV

Principles and method 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.

Reference Books:

B. Vasantharaj David and T. Kumaraswami 1982. Elements of Economic Entomology, Popular book Depot, Chennai.

Nayar, K.K., Ananthakrishnan, T.N. and B.V. David, V 1992 General and Applied Entomology Tata McGraw, New Delhi.

P.G. Fenemore Manual. Silkworm Rearing. FAO Agricultural Service Bulletin, Rome.

ALLIED – 2
ECONOMIC ENTOMOLOGY – II

Objectives:

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.

Reference Books:

B. Vasantharaj David and T. Kumaraswami 1988. Elements of Economic Entomology. Popular book Depot, Chennai.
Nayar, K.K., AnanthaKrishnan, T.N. and B.V. David 1992 General and applied Entomology Tata McGraw, New Delhi.
P.G. Fenemore, Alka Prakash 1997 Allied Entomology, Wiley Eastern Ltd. New York.
Wigglesworth J.B., 1994. Insect physiology, Chapman and Hall, London.
Temphare D.B., 1984. A Text Book of Insect Morphology, physiology and Endocrinology. S. chand and co., New Delhi.

ALLIED PRACTICAL

ECONOMIC ENTOMOLOGY – I & II

I. MAJOR PRACTICAL

Model / chart – Draw and comment
Life cycle of Holometabolous, Hemimetabolous and Ametbolous Insects [Atleast one example in each]
Insect formulations and plant protection appliances.

II. MINOR PRACTICAL

Mounting
Mouth parts – Bed Bug, Mosquito and House fly
Sting apparatus of Honeybee.

III. SPOTTERS

Pests of agricultural Importance – citrus Butterfly, Rhinocerous beetle, Stem borer – Rice, Sugar cane, Cholam, Cotton, Fruit borer, Root borer, six spotted beetle, grasshopper, Crickets, Pod Borer [pulses], Rice weevil, Mango nut weevil. Pest of Medical Importance – Mosquito, Housefly, cockroach, Ticks, Mites, Louse, Bed Bug, Plasmodium, Filarial Worm, Loa Loa, Dust mite.

IV. 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.