PSG College of Arts & Science

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B.Sc. ZOOLOGY

2017 - 2020

BSc Zoology
Scheme of Examinations
(For students admitted in June 2014 – 15 & onwards)

CODE NO.	SUBJECT	EXAM DURA-TION (Hrs)	Max. Marks			Credit points
			CA	CE	Total	
First Semester						
	Part –I					
14LAU01 12LAU01 14LAU01	Tamil – I OR Hindi – I OR French-I	3	25	75	100	3
	Part –II					
14EU01	Communicative English - I- Interpersonal Communication	3	25	75	100	3
	Part –III					
14ZOU01	Animal Diversity-I	3	25	75	100	4
14ZOU02	Cell Biology	3	25	75	100	4
14ZOU03	Plant Biology –I (Allied-BO)	3	25	75	100	4
--	Major Practical – I	--	--	--	--	--
--	Plant Biology Practical (Allied-BO)	--	--	--	--	--
Second Semester						
	Part –I					
14LAU02 12LAU02 14LAU02	Tamil – II OR Hindi – II OR French-II	3	25	75	100	3
	Part –II					
14EU02	Communicative English II– Academic Communication	3	25	75	100	3
	Part –III					
14ZOU04	Animal Diversity – II	3	25	75	100	4
14ZOU05	Embryology	3	25	75	100	4
14ZOU06	Plant Biology – II (Allied-BO)	3	25	75	100	4
14ZOU07	Major Practical – I	3	40	60	100	4 (2+2)
14ZOU08	Plant Biology Practical (Allied-BO)	3	40	60	100	2 (1+1)
	Part –IV					
14VEU01	Value Education	--	100	--	100	2

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CODE NO.	SUBJECT	EXAM DURA-TION (Hrs)	Max. Marks			Credit Points
			CA	CE	Total	
Third Semester						
	Part –I					
14LAU03 12LAU03 14LAU03	Tamil – III OR Hindi – III OR French-III	3	25	75	100	3
	Part –II					
14EU03	Communicative English III- English for Career	3	25	75	100	3
	Part –III					
14ZOU09	Computer applications in Biology	3	25	75	100	3
14ZOU10	Biostatistics (Allied-ST)	3	25	75	100	4
14ZOU11	Chemistry I (Allied-CH)	3	25	75	100	4
--	Major Practical – II	--	--	--	--	--
--	Chemistry Practical (Allied – CH)	--	--	--	--	--
	Part –IV					
14ESU01	Environmental Studies	--	100	--	100	2
Fourth Semester						
	Part –I					
14LAU04 12LAU04 14LAU04	Tamil – IV OR Hindi – IV OR French-IV	3	25	75	100	3
	Part –II					
14EU04	Communicative English- IV English Through Literature and Newspapers	3	25	75	100	3
	Part –III					
14ZOU12	Physiology	3	25	75	100	4
14ZOU13	Biochemistry(Allied-BC)	3	25	75	100	4
14ZOU14	Chemistry – II (Allied-CH)	3	25	75	100	4
14ZOU15	Major Practical–II	3	40	60	100	4 (2+2)
14ZOU16	Biochemistry Practical (Allied-BC)	3	40	60	100	1
14ZOU17	Chemistry Practical (Allied – CH)	3	40	60	100	2 (1+1)
	Part –IV					
14SBU01	**Skill Based Subject :** Internet Security	--	100	--	100	2

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CODE NO.	SUBJECT	EXAM DURA-TION (Hrs)	Max. Marks			Credit points
			CA	CE	Total	
Fifth Semester						
	Part –III					
14ZOU18	Microbiology	3	25	75	100	4
14ZOU19	Biotechnology – I	3	25	75	100	4
14ZOU20	**Core Elective-I:** Economic Zoology-I	3	25	75	100	4
14ZOU21	Genetics	3	25	75	100	4
--	Major Practical – III	--	--	--	--	--
--	Major Practical – IV	--	--	--	--	--
	PART-IV					
14NME01	**Non-Major Elective (1) :** EDC	--	100	--	100	2
14NME02	**Non-Major Elective (2) :** General Awareness (On-line Test)	1½	--	100	100	2
Sixth Semester						
	Part –III					
14ZOU22	Biotechnology – II	3	25	75	100	4
14ZOU23	Immunology	3	25	75	100	4
14ZOU24	Core Elective - II: Economic Zoology-II	3	25	75	100	4
14ZOU25	Evolution	3	25	75	100	4
14ZOU26	Major Practical – III	3	40	60	100	6 (3+3)
14ZOU27	Major Practical – IV	3	40	60	100	4 (2+2)
					Total Credits	**136**

PART-V			Credits
1.	**Extension Activity** : NSS / NCC / Sports / Department Activity	I – VI semesters	2
2.	**Competence Enhancement :** Add-on Course / Women's Studies / Extra paper	I – VI semesters	2
		Grand Total	**140**

Interdisciplinary / Extra Departmental Courses offered by the Department

ALLIED

14BOU03	Zoology – I (for BSc Botany)	I SEMESTER
14BOU06	Zoology – II (for BSc Botany)	II SEMESTER
14BOU08	Zoology Allied Practical (for BSc Botany)	I & II SEMESTER
14BCV03	General Biology (for BSc Biochemistry)	ISEMESTER
14BCV05	Biology Practical (for BSc Biochemistry)	ISEMESTER

Non-Major Elective (1): Extra Departmental Course

14EDCZOU Ornamental Fish Keeping (Cluster NME)

14ZOU01 ANIMAL DIVERSITY -I (65 Hours) FIRST SEMESTER

OBJECTIVES

1. To acquire knowledge of fundamental principles of different phyla under the division Invertebrata.
2. To gain thorough knowledge of the diagnostic and adaptive features of Invertebrate animals.

UNIT-I (14 hours)

Phylum Protozoa and Porifera.

1. General characters of Phylum Protozoa and classification up to the level of classes with salient features and an example for each class.
2. Structure and life cycle of *Paramecium caudatum*.
3. Structure, life cycle, disease caused and control measures of *Plasmodium vivax*.
4. Nutrition in Protozoa
5. General characters of Phylum Porifera and Classification up to the level of classes with salient features and an example for each class.
6. Structure and life cycle of *Leucosolenia*.

UNIT-II (14 hours)

Phylum Coelenterata and Helminthes.

1. General characters of phylum Coelenterata and classification up to the level of classes with salient features and an example for each class.
2. Structure and life cycle of *Obelia.*
3. General characters of Phylum Helminthes and classification up to the level of classes with salient features and an example for each class.
4. Structure and life history of *Taenia solium.*
5. Brief account on parasitic Helminth worms.

a) *Ancylostoma duodenale*
b) *Enterobius vermicularis*
c) *Wuchereria bancrofti*

UNIT-III (12 hours)

Phylum Annelida

1. General characters of Phylum Annelida and classification up to the level of classes with salient features and an example for each class.
2. Structure and life history of *Megascolex marutii*
3. Brief account on Vermiculture.

UNIT-IV(12 hours)

Phylum Arthropoda

1. General characters of Phylum Arthropoda and classification up to the level of classes with salient features and an example for each class.
2. Morphology, anatomy and life history of marine prawn *Penaeus.*
3. Brief account on Prawn culture.
4. Organisation and affinities of Peripatus.

UNIT-V (13hours)

Phylum Mollusca and Echinodermata.

1. General characters of Phylum Mollusca and classification up to the level of classes with salient features and an example for each class.
2. Morphology and organ systems of *Pila globosa.*
3. Brief account on pearl culture
4. General characters of phylum Echinodermata and classification up to the level of classes with salient features and an example for each class.

5. Morphology and organ systems of starfish.
6. Structure, organization and affinities of *Balanoglossus.*

REFERENCE BOOKS:

1. Ayyar, E.K and Ananthakrishnan, .T.N., 2010. A Manual of Zoology Vol I. Viswanathan Pvt. Ltd.
2. Jordon, E.L and Verma, P.S., 2012. Invertebrate Zoology. S. Chand & Co.,New Delhi
3. Kotpal, R.L., 2011. Modern Text Book of Zoology: Invertebrates. Rastogi Publications, Meerut

14ZOU02 CELL BIOLOGY (60 Hours) FIRST SEMESTER

OBJECTIVES

1. To make the students to understand the principles and working of microscopes.
2. To impart knowledge about the fine structure of various types of cells and cell organelles
3. To make the students to understand the biological secrets of Life.

UNIT- I (12 Hours)

1. Cell theory
2. Cell types – Prokaryotic and Eukaryotic
3. Cell division – Cell cycle, Mitosis and Meiosis.
4. Nuclear and cytoplasmic stains and staining techniques.
5. Structure, functioning and applications of:
    a) Compound Microscope
    b) Phase -Contrast Microscope
    c) Electron Microscope.

UNIT – II (12 Hours)

Ultra structure, chemical composition, origin and functions of:

1. Plasma membrane
2. Golgi bodies
3. Lysosomes
4. Ribosomes

UNIT – III (12Hours)

Ultra structure, chemical composition, origin and functions of:

1. Endoplasmic reticulum
2. Mitochondria and Mitochondrial genome
3. Centrosome
4. Nucleus.

UNIT – IV (12 Hours)

1. Chromosomes
    a) Structure
    b) Types
    c) Functions
    d) Special types of chromosomes
2. DNA
    a) Physico-Chemical structure
    b) Semi-Conservative method of replication
3. RNA
    a) Structure of mRNA, rRNA, & tRNA
4. Protein synthesis

UNIT – V (12 Hours)

1. Apoptosis
2. Cancer
    a) Characteristics of cancer cells
    b) Viral oncogenes
    c) Activation of Proto – oncogenes
    d) Tumour suppressor genes
    e) Cellular functions of oncoproteins

REFERENCE BOOKS:

1.Arumugam. N., 2008, Cell Biology and Molecular Biology. Saras Publication, Nagercoil
2. Agarwal. V.K. and Verma P.S., 2008, Cell Biology. S. Chand & Co., New Delhi
3.. Powar C.B.2007, Cell Biology , Himalayan Publishing House, New Delhi
4. Singh SP and Tomar BS, 2007, Cell Biology. Rastogi Publications, Meerut
5. Gupta, PK.2008, Cell and molecular biology, Rastogi Publications, Meerut.

14ZOU03 **PLANT BIOLOGY I** **45 hours**

Unit I

Diversity of Plants - Five Kingdoms of Biological System.
Algae: Study of Vegetative Structure and Reproduction of *Ocillatoria*, *Volvox* and *Dictyota*.
Fungi: *Albugo* and *Aspergillus.* 9 hours

Unit II

Plant Diseases - Symptoms of Plant diseases, Disease Cycle of Tikka Leaf Spot and Rust of Wheat, Bacterial Blight of Paddy.
Structure and reproduction of *Anthoceros, Adiantum* and *Cycas.* 9 hours

Unit III

Medicinal Plants - Active Principles of Medicinal Plants. Uses of Medicinal Plants in Pharmaceutical Industries, Cosmetics, Repellants, and Organic Pesticides.
Identifying Features, Medicinal Properties, and Active Principles of *Justicia adathoda*, *Asparagus recemosus, Phyllanthus amarus,* and *Vitex negundo*.
9 hours

Unit IV

Angiosperms - Benthem and Hookers Classification, Characteristics and Economic uses of following Plant Families.
Annonaceae, Brassicaceae, Rutaceae, Leguminosae and Euphorbiaceae 9 hours

Unit V

Rubiaceae, Asclepiadaceae, Acanthaceae, Arecaceae and Poaceae.
9hours

Text Book / Reference books

1. Vashishta, B. R., A. K. Sinha and V. P. Singh. (2008). Botany for Degree Students: Algae. S. Chand & Company Ltd, New Delhi.
2. Sharma,P. D. (1986). Text Book of Taxonomy -. Tata McGraw Hills, New Delhi.
3. Singh V. and D.K Jain (1981). Taxonomy of Angiosperms. Rastogi Publication, Meerut.
4. Sambamurthy.A.V.S.S.(2005) Taxonomy of Angiosperms.I.K.International Pvt.Ltd.New Delhi.
5. Vedavathy.S,Mirudhula and Sudhaskar A (1997).Tribal Medicines of Chittoor District
(A.P.). Herbal Folklore Foundation. Tripathi.

14ZOU04 ANIMAL DIVERSITY- II (65 Hours) II SEMESTER

OBJECTIVES

1. To acquire knowledge of characteristic features of different chordate animals.
2. To gain knowledge about the general aspects of fishes and snakes

UNIT –1 (12 Hours)

1. General characters and outline classification of Chordata.
2. General characters of Prochordata and classification up to the level of classes with salient features and an example for each class.
3. Morphology and organ systems of *Amphioxus.*
4. Retrogressive metamorphosis in Ascidian.

UNIT – II (14 Hours)

1. General characters of super class Pisces and classification up to the level of classes with salient features and an example for each class.
2. Morphology and organ systems of *Scoliodon* (Excluding exo and endo skeletons
3. Accessory respiratory organs in fishes.
4. Organisation and affinities of Dipnoi.
5. Brief account of edible fresh water fishes.
    a) *Catla*
    b) *Rohu*
    c) *Tilapia*
6. By – products of fishing industry.

UNIT – III (12 Hours)

1. General characters of class Amphibia and classification of modern amphibia up to the level of orders with salient features and an example for each class.
2. Morphology and organ systems of Frog (Excluding exo and endo skeletons).
3. Parental care in Amphibia.

UNIT – IV (13 Hours)

1. General characters of class Reptilia.
2. Morphology and organ systems of *Calotes* (Excluding exo and endo skeletons)
3. Poisonous and non-poisonous snakes of south India.
4. First aid for snake bite
5. Sphenodon as living fossil

UNIT – V (14 Hours)

1. General characters of class Aves and class Mammalia.
2. Morphology and organ systems of *Columba livia* (Excluding exo and endo skeletons)
3. Flightless birds
4. Migration in birds
5. Morphology and organ systems of Rabbit (Excluding exo and endo skeletons)
6. Aquatic adaptation in mammals

REFERENCE BOOKS:

1. Ayyar, E.K., and Ananthakrishnan, T.N., 2010. A Manual of Zoology vol II (Chordata). Viswanathan & Co. Pvt Ltd., Madras
2. Jordon, E.L., and Verma P.S., 2013. Chordate Zoology. S. Chand & Co.,New Delhi
3. Kotpal. R.L., 2011, Modern Text Book of Zoology: Vertebrates., Rastogi Publications, Meerut

14ZOU05 EMBRYOLOGY (65 Hours) SECOND SEMESTER

OBJECTIVES

1. To acquire knowledge of development of different animals.
2. To utilize the knowledge for human welfare.

UNIT – I (13 Hours)

1. Introduction
2. Gametogenesis
   a) Spermatogenesis
   b) Structure of a mammalian sperm and types of sperms.
   c) Oogenesis
   d) Structure and types of eggs.
   e) Egg membranes
3. Fertilization
4. Parthenogenesis

UNIT – II (13 Hours)

1. Cleavage and Blastulation.
2. Fate - map and Gastrulation in *Amphioxus* and Frog.
3. 4. Organogenesis of frog:
   Development of Brain, heart, Eye and Ear.

UNIT – III (13 Hours)

1. Embryonic induction in Vertebrates.
2. Embryogenesis of chick
   a) Structure of egg
   b) Cleavage
   c) Blastulation
   d) Fate - map
   e) Gastrulation
4. Chick development during 24, 48, 72 and 96 hours of Incubation.
5. Extra-embryonic membranes of Chick.

UNIT – IV (13Hours)

1. Embryogenesis of mammal – Rabbit.
   a) Structure of egg
   b) Cleavage
   c) Blastocyst
2. Types of Placenta in mammals.
3. Sexual cycle and role of hormones

UNIT – V (13 Hours)

1. Manipulation of reproduction in animals:
   a) Artificial insemination
   b) Embryo transfer
2. In vitro fertilization
   a). Embryo cloning: Quadriparental hybrids
   b) Embryonic stem cells: Production of chimeric mouse

REFERENCE BOOKS:

1. Arumugam. N, 2008. A Text book of Embryology. Saras Publication, Kanyakumari.
2. Balinsky. B.I. 2007. An Introduction to Embryology. W.B.Saunders Company, USA
3. Verma, P.S. and Agarwal, V.K., 2008, Chordate Embryology. S. Chand & Co., New Delhi.

14ZOU06 **PLANT BIOLOGY II** **45 hours**

Unit I

Plant Tissue Culture - Laboratory Organisation, Sterilization, Media Preparation.Callus culture, Root culture, Shoot apex culture, Isolation and Culture of Plant Protoplasts. Biotechnology for crop improvement with reference to tissue culture.

9 hours

Unit II

Industrial Microbiology - Industrial production of Citric acid, Alcohol, Penicillin and Mushrooms (*Agaricus* and *Pleurotus*).

9 hours

Unit III

Horticulture I - Principles of Landscape and Garden Designing. Laying and Maintaining lawn. Rock Gardening, Water Garden and Bonsai, Choice and Techniques of Maintaining Indoor Garden.

9 hours

Unit IV

Horticulture II - Propagation, Cultivation, Marketing and Uses of Jasmine, Asteraceae members (*Chrysanthemum*, *Tagetus*) Climbers, Turmeric and Pepper.

9hours

Unit V

Plant Physiology

Photosynthesis - Photosynthetic Apparatus, Pigments, Absorption Spectrum, Light Reaction and Dark Reaction (Calvin Cycle only).

Respiration – Aerobic, Anaerobic and Fermentation.

Plant Growth Regulators - Chemistry, Mode of action and Physiological role of Auxins and Cytokinins.

9 hours

Text Books / Reference Books

1. B. D. Singh**.** (2003).Biotechnology, Kalyani Publishers, Ansari Road, Daryaganj, New Delhi
2. Kumar**.** N (1977): Introduction to Horticulture, Rajalakshmi Publications, Nagercoil, India.
3. A. H. Patel (1985). Industrial Microbiology, McMillan (India) Ltd., Bombay
4. Verma, P. (2006). Plant Physiology, Emkay Publications, New Delhi.

14ZOU07 MAJOR PRACTICAL – I I & II SEMESTERS

1. Identification, Classification and Comments on
   Paramecium – Entire, *Paramecium* – Binary fission
   Paramecium – Conjugation, *Leucosolenia* – Entire
   Obelia colony, *Obelia* medusa,
2. Identification, Classification and Comments on
   Taenia solium – Entire, *Taenia solium* – Scolex
   Cysticercus larva (Bladder worm),
   Enterobius vermicularis, Earthworm – Entire, *Penaeus* – Entire
   Nauplius larva, Protozoea larva, Zoea larva, Mysis larva.
3. Mounting of mouth parts of cockroach
4. Dissection of digestive system of cockroach
5. Dissection of nervous system of cockroach
6. Dissection of reproductive system of cockroach
7. Identification, Classification and Comments on
   Pila globosa – Entire, Radula, Pearl oyster
   Starfish – Entire, Pedicellaria, *Balanoglossus* – Entire
8. Identification, Classification and Comments on
   Amphioxus – Entire, *Ascidian* - Entire
   Shark- Lateral and Ventral views, Placoid scale.
6. Mounting of scale of a fish
7. Dissection of digestive system of a marketable fish – Demonstration only
8. Identification, Classification and Comments on
   Calotes, Cobra, Krait, Viper
9. Identification, Classification and Comments on
   Lycodon, Ptyas, Pigeon – Entire,Quill feather, Rabbit – Entire
10. Squash preparation of onion root tip to show the stages of mitosis.
11. Mounting of giant chromosomes in *Chironomous* larva.
12. Observation of the following developmental stages of Frog.
    Cleavage, Blastula, Gastrula stage.
13. Observation of the following developmental stages of Chick.
    24 Hours, 48 Hours, 72 Hours and 96 Hours.
14. Observation of Placenta in Human

INSTRUCTIONS TO CANDIDATES

CE PRACTICAL EXAM

Candidates should maintain a laboratory record which should contain illustrations and notes. Record must be submitted for the comprehensive examination.

Major Practical I will be conducted at the end of the First year.

Candidates without bonafide record and 75% of attendance will not be permitted for the comprehensive examination.

14ZOU08 **PLANT BIOLOGY PRACTICAL**

1. Microscopic Observation of Vegetative and Reproductive structures of *Oscillatoria* and *Volvox.*
2. Morphology and Reproduction of *Dictyota* thallus.
3. Microscopic observation of *Albugo* and *Aspergillus.*
4. Morphology and Reproduction of *Anthoceros.*
5. Morphology and Reproduction of *Adiantum*
6. Morphology and Reproduction of *Cycas.*
7. Recording the identifying morphological features of any 10 medicinal plants
8. Identification of plants pertaining to families mentioned under Unit IV and V.
9. Glasswares Sterilization. (Glassware used in Plant tissue culture).
10. Microscopic observation of *Penicillin* and *Aspergillus*
11. Mushroom Cultivation and Observation of the fruit body formation (Paddystraw).
12. Record of 20 Horticultural Plants.
13. Separation of Leaf Pigments by Paper Chromatographic Method.
14. Measuring Rate of Photosynthesis under Different Light Intensities.
15. Study of Fermentation using Kuhne's Vessel.

14ZOU09 COMPUTER APPLICATIONS IN BIOLOGY (40 Hours) III SEMESTER

OBJECTIVES

1. To understand the basic structure of computer and MS Office software
2. To gain knowledge in resources of internet and Bioinformatics.

UNIT- I (8 Hours)

1. Basic structure of a computer – Input devices – CPU – Output devices – External storage devices – Operating system
2. MS WORD: Parts of WORD window – Editing and Formatting text – Saving a document – Printing a document – Creating Table

UNIT –II (8 Hours)

MS EXCEL: Excel window –Range – Auto fill – Auto sum –Functions – Charts
MS POWERPOINT: Slide layout – Views – Design template – Slide transition – Animation

UNIT – III (8 Hours)

MS ACCESS: Main elements of Access - Creating table in design view

UNIT- IV (8 Hours)

Resources of internet
Browsers: Internet explorer
Internet addressing
Web search engines: Google
E-mail

UNIT- V (8 Hours)

Data bases: NCBI – EMBL – DDBJ
Getting nucleotide and protein sequence from NCBI
Getting 3D protein structure
Sequence analysis using BLAST
Molecular visualization: Ras Mol

REFERENCE BOOKS:

1. Balagurusamy E .1997. Programming in BASIC. 3rd Edition. Tate McGraw Hill Publishing Co. Ltd.
2. Ramesh Bangia. 2001. Learning MS office XP. Khanna Book Publishing Co.
3. Alexis Leon and Leon M. 1998. Internet for Everyone. Leon Tech World.
4. Harley Hahn, 1996. The Internet – Complete Reference, II ed., Tata McGraw Hill.
5. Mani,K and Vijayaraj,N.2004. Bioinformatics, Aparnaa Publication

14ZOU10 **BIOSTATISTICS** **Semester-III**

Objective: To impart the knowledge of Statistical technique for the students in Botany/Zoology.

UNIT-I **Hours: 9**

Definition and Development of Bio-Statistics, Concepts of sample and population – Biological variables. Source of Statistical data-Primary and Secondary data-Collection of data.

UNIT-II **Hours: 9**

Classification and Tabulation of Data-Diagrammatic and Graphic representation of data-Construction of a frequency table – Simple Problems.

UNIT-III **Hours: 9**

Measures of Central tendency-Mean, Median, Mode-simple problems

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UNIT-IV **Hours: 9**

Measures of variation – Range, Mean deviation, Quartile deviation and Standard deviation-co-efficient of variation – Simple problems.

UNIT-V **Hours: 9**

Simple correlation –rank correlation –regression (for ungrouped data only)-Simple problems.

REFERENCE:

1. Bancraft : Introduction to Bio Statistics
2. Baily N.J : Statistical Methods in Biology
3. Daniel : Bio-Statistics
4. Gupta SP : Statistical methods

14ZOU11 Chemistry I (50 Hours) Semester-III

Objectives

- To develop a foundation in the concepts and facts in all areas of chemistry
- To gain basic knowledge in the fields of drugs, dyes and environmental chemistry

UNIT I

Inorganic Chemistry (10 Hrs)

Atomic structure – orbit, orbital – definition, different types of orbitals (s, p, d and f) – shapes of s, p, d and f orbitals. Aufbauf principle, Hund's rule, Pauli exclusion principle. Shapes of molecules – VSEPR theory. Shapes of simple molecules BF_3, PCl_5, SF_6, IF_6 and IF_7. Oxidation and reduction (electronic concept)– oxidation number – definition and calculation of oxidation number. Oxidizing and reducing agents – definition and examples.

UNIT II

Organic Chemistry (10 Hrs)

Aromatic compounds – Huckels rule - statement and examples. Benzene – preparation, properties(mechanism not required) and uses.

Alkaloids – definition, classification, preparation, properties and uses of piperine, nicotine and coniine.

Terpenoids – classification – isoprene rule – isolation and uses of geraniol, citral, menthol and camphor.

Synthetic polymers – classification, Preparation and uses of polyethylen, teflon and terylene.

UNIT III

Drugs and Dyes (10 Hrs)

Chemotherapy – analgesics – antipyretics – antibiotics – tranquilizers - sulpha drugs – anesthetics – antiseptics – disinfectants – definition and examples(Two) and uses.

Dyes – definition – examples - requisites of dyes- chromophore, auxochrome – chromogen. Classification (on the basis of application and chemical structure) –Preparation of malachite green, methyl orange and phenolphthalein and alizarin.

UNIT IV

Physical Chemistry (10 Hrs)

Kinetics – order, molecularity – Derivation of rate constant for first order reaction - examples - pseudo uni molecular reaction. Complex reactions - consecutive reactions, parallel reactions, reversible reactions and chain reactions – definitions and examples.

Catalysis – types of catalysis –Characteristics of catalytic reactions – Promoters – Catalytic poisoning – Auto catalysis – Negative catalysis – Enzyme catalysis – Mechanism of enzyme catalysis – Characteristics of enzyme catalysis.

UNIT V

Environmental Chemistry (10 Hrs)

Environmental pollution - introduction, pollutant, classification of pollutants - types of pollution. Air pollution – définition and sources – effects of acid rain, global warming. Water pollution – definition, classification of water pollution- definition of DO, BOD and COD – effects of Eutrophication Water treatment – primary, secondary and tertiary. Soil pollution - definition –sources of soil pollution – Factors affecting soil pollution– effects of pesticides. Contamination of foods with toxic chemicals, pesticides and insecticides.

Reference Books

1. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma and M.S. Pathania, Shoban Lal Nagi.n Chand and Company, Jalandhar, 27th Edition, 1986.
2. Organic Chemistry, R.T. Morrison and R.N. Boyd, Prentice Hall of India Private Limited, New Delhi, 6th Edition, 2004 .
3. Text book of Inorganic Chemistry, P.L.Soni, Sultan Chand and Sons, New Delhi, 13th Edition, 1981.
4. Environmental Chemistry, A.K.De, Wiley Eastern LT, New Age international Lt., New Delhi, 3rd Edition, 1995.

14ZOU12 PHYSIOLOGY (60 HOURS) IV SEMESTER

OBJECTIVES

This syllabus makes the students to:

1. Know about the structure and functions of organ systems of various animals.
2. Gain knowledge on the chronobiological aspects.

UNIT –I (08 Hours)

1. Digestion and absorption of food stuffs.
   a) Digestion in the buccal cavity
   b) Digestion in stomach.
   c) Digestion in intestine
   d) Hormonal control of digestion
   e) Absorption of digested food.
2. Oxidative deamination and transamination.
3. β- Oxidation.

UNIT – II (08 Hours)

1. Respiration:
   a) Types of respiratory organs.
   b) Respiratory pigments
   c) Transport of O_2 and CO_2
   d) Control of respiration.

2. Circulation:
   a) Structure and functions of human heart
   b) Cardiac cycle
   c) Blood and its composition , clotting and blood pressure

UNIT – III (08 Hours)

1. Lymphatic system and its functions.
2. Excretion
   a) Ammonotelism, ureotelism and uricotelism.
   b) Structure of Mammalian kidney.
   c) Urine formation in man
   d) Control of kidney function.
   e) Formation of ammonia, urea and uric acid.

UNIT – IV (08 Hours)

1. Muscles
   a) Types of muscles
   b) Ultra structure and contraction of skeletal muscle.
2. Sense Organs
   a) Structure of human eye and image formation.
   b) Structure of human ear and mechanism of hearing

UNIT – V (08 Hours)

1. Structure and types of neuron.
2. Conduction of nerve impulse
3. Reflex actions.
4. Various endocrine glands in man and their functions.

REFERENCE BOOKS:

1. Hoar, W.S., 2007. General and Comparative Physiology, Prentice Hall , India
2. Prosser, C.L and Brown 2006. Comparative Animal Physiology. W.B. Saunders.
3. Verma, P.S., and Agarwal, V.K., 2008. Animal Physiology. S. Chand & Co. New Delhi

14ZOU13

BIOCHEMISTRY - Allied

48 Hrs

OBJECTIVES

UNIT I 10 hrs

Carbohydrates:

Monosaccharides: definition, classification, structure of important monosaccharides (Fischer's and hearth's formula).

Reactions of monosaccharides: reactions with acids and alkali, formation of sugar alcohol, sugar acids and osazone.

Disaccharides: occurrence, structure and reactions of maltose, lactose and sucrose.

Polysaccharides: definition classification and biological significance. Structure function and hydrolysis of starch, glycogen, cellulose and chitin.

UNIT II 10 hrs

Lipids- Definition and classification. Properties and biological function of fatty acids, neutral fats, phospholipids (lecithin, cephalin only). Cholesterol, sphingolipids.

Chemical elements in biomolecules. Structure and biological significance of water. Hydrogen bond in water and its significance. Biological buffers and their significance.

UNIT III 10 hrs

Proteins:

Biological significance and classification of aminoacids (structures not required), definition and significance of peptide bond. Structure of proteins, hydrolysis Denaturation and isoelectric ph of proteins.

Enzymes:

Definition, biological significance. The role of co-enzymes, cofactors in enzymic reactions(no structure of coenzyme required) and factors affecting enzyme reactions, mechanism of enzyme reactions(no kinetic studies)

UNIT IV 9 hrs

Nucleic acids

Biological significance, nucleic acid bases, nucleosides and nucleotides. Definition, classification of nucleic acids, structure of DNA.

Techniques:

Chromatography, Electrophoresis and Colorimetry (basic discussion only).

UNIT V 9 hrs

Metabolism

Definition, biological redox reaction, glycolysis, TCA cycle and β-oxidation of fatty acids and energy derivation in the above reactions. Deamination decarboxylation and transamination of aminoacids.Urea cycle.

REFERENCES

1. Nelson, D.L& Cox, M.M (2005) "Lehninger Principles of Biochemistry", W.H. Freeman and Company, New York.

2. Voet, D., Voet, J.G & Pratt, C.W. (1999) "Fundamentals of Biochemistry", John Wiley & Sons Inc., New York.

3. Thomas Creightn. (1984). Proteins. W.H. Freeman and Company. Second Edition.

14ZOU14 **Chemistry II (50 Hours)** **Semester-IV**

Objectives

- To develop a foundation in the concept and facts in all areas of chemistry
- To be familiar with the fundamental reactions involved in chemistry
- To create awareness for safe handling of chemicals and laboratory hygiene

UNIT I

Inorganic Chemistry **(10 Hrs)**

Sulphur compounds – sodium hydrosuphite- preparation properties and uses. Peracids of sulphur – permono sulphuric acid and perdi sulphuric acid – preparation properties and uses. Sulphur compounds as preservatives – sodium metabisulphite. Coordination compounds – definition of coordination compounds – Werner's coordination theory- nomenclature. Chelation and its industrial importance. EDTA and its applications. Biological role of haemoglobin and chlorophyll. Fertilizers – definition, classification of fertilizers, need of fertilizers. Nitrogenous fertilizers–urea. Phosphatic fertilizers – triple superphosphate.

UNIT II

Organic Chemistry **(10 Hrs)**

Heterocyclic compounds – definition and classification – chemistry of furan, thiophene, pyridine (preparation, properties and uses). Amino acids – definition, classification – glycine, alanine – preparation properties and uses. Proteins – definition, classification – primary, secondary and tertiary structure of proteins.

Enzymes – characteristics and mechanism of enzyme action, coenzyme. Manufacture of spirit, wine and vinegar. Ethyl alcohol from molasses.

UNIT III

Purification and separation techniques

Concentration Terms -Mass percentage, volume percentage, normality, molarity, molality, mole fraction, and ppm.

Extraction of organic compounds- methods of purification of solids- crystallization, fractional crystallization, sublimation methods of purification of liquids- Distillation, fractional distillation, steam distillation, distillation under reduced pressure, counter current distribution.

Chromatography- types, paper, column, Thin layer, ion-exchange chromatography principle and application.

UNIT IV

Physical Chemistry **(10 Hrs)**

Faraday's law and Ohm's law - conductance – specific conductance, molar conductance and equivalent conductance definitions. Relationship between specific conductance and equivalent conductance. Effect of dilution on conductance. Measurement of conductance of the solution-cell constant, definition and determination. Kohlrasch law, Oswald's law. p^H and buffer solutions – definition, mechanisms of buffer action, importance of pH and buffers in the living system. Photochemistry – laws of photochemistry- Lambert's law, Beer's law. Quantum yield- photo sensitization.

UNIT V

Environmental Chemistry **(10 Hrs)**

Chemistry of hemoglobin, myoglobin, transport of oxygen transport and storage, non heme iron sulphur proteins, role of essential and trace elements in biological systems.

Heavy metals – industrial uses and pollution sources. Toxicity of mercury, cadmium, lead, chromium and zinc. Fluoride toxicity.

Green chemistry – an elementary idea, green synthesis (any two example).

Reference Books

1. Principles of Physical Chemistry, B.R. Puri, L.R. Sharma and M.S. Pathania, Shoban Lal Nagin Chand and Company, Jalandhar, 27th Edition, 1986.
2. Organic Chemistry, R.T. Morrison and R.N. Boyd, Prentice Hall of India Private Limited, New Delhi, 6th Edition, 2004 .
3. Text book of Inorganic Chemistry, P.L.Soni, Sultan Chand and Sons, New Delhi, 13th Edition, 1981.
4. Environmental Chemistry, A.K.De, Wiley Eastern LT, New Age international Lt., New Delhi, 3rd Edition, 1995.

14ZOU15 MAJOR PRACTICAL – II III & IV SEMESTERS

MS WORD

1. Creating, Editing and Formatting a document
2. Preparing document with special effects
3. Creating tables
4. Perform Mail - merge

MS EXCEL

5. Preparing and entering worksheet
6. Work sheet using formula
7. Creating charts
8. Statistical analysis of data.

MS ACCESS

9. Creating database in design view
10. Creating form and report using wizard

MS POWER POINT

11. Prepare slides on a topic in Zoology

BIOINFORMATICS

12. Collect literature using search engine
13. Retrieve images for Spirulina, Saccharomyces, Anabaena, Nostoc, Drosophila
14. Visit NCBI, EMBL and DDBJ and explore salient features
15. Retrieve nucleotide and protein sequence
16. Sequence analysis using BLAST
17. Visualize a molecule using Ras Mol

GENERAL

18. Virtual dissections using computer software.

INSTRUCTIONS TO CANDIDATES

CE PRACTICAL EXAM

Candidates should maintain a laboratory record. Record must be submitted for the comprehensive examination.
Major Practical II will be conducted at the end of the second year.

Candidates without bonafide record and 75% of attendance will not be permitted for the comprehensive examination.

14ZOU16 **BIOCHEMISTRY ALLIED- PRACTICALS**

2 hrs/week

Analysis of carbohydrates- glucose
Fructose
Xylose
Sucrose
Maltose
Arabinose

Identification of the given sugar

Analysis of amino acids- Tyrosine
Methionine
Cysteine
Tryptophan
Arginine
Histidine

Estimation of ascorbic acid - titrimetry

Estimation of Protein by Biuret Method.

14ZOU17 **Chemistry Practical (50 Hours)** **Semesters-I&II**

UNIT I

Acidimetry and Alkalimetry **(9 Hrs)**

1. Estimation of sodium hydroxide
2. Estimation of sodium carbonate
3. Estimation of hardness of water

UNIT II

Permanganometry **(9 Hrs)**

4. Estimation of ferrous sulphate
5. Estimation of ferrous ammonium sulphate
6. Estimation of oxalic acid

UNIT III

Dichrometry **(8 Hrs)**

7. Estimation of ferrous iron using internal indicator
8. Estimation of ferrous iron using external indicator

UNIT IV

Organic Analysis **(12 Hrs)**

Analysis of organic compounds to detect
(i) Special elements present/absent (ii) Aromatic/ aliphatic (iii) Saturated / unsaturated

UNIT V

Detection of Functional Groups by Confirmatory Tests **(12 Hrs)**

Glucose, benzoic acid, cinnamic acid, succinic acid, benzaldehyde, acetophenone, benzamide, urea, aniline and phenol.

Reference Books

1. Basic Principles of Practical Chemistry, V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu,
2. Practical chemistry, A.O. Thomas, Scientific Book Centre, Cannanore –I, 7th edition 1999.

14ZOU18 **MICROBIOLOGY (60 Hours)** **V SEMESTER**

OBJECTIVES

To enable the students to:

1. Gain knowledge about the microbial world.
2. Develop skills in the preparation of culture methods of bacteria.
3. Understand the mode of transmission of infectious diseases

UNIT – I (12 Hours)

1. History of Microbiology:
   Contributions of:
   a) Leeuwenhoek
   b) Robert Koch
   c) Louis Pasteur
   d) Edward Jenner
   e) Alexander Fleming
2. General structure of Bacteria.
   a) Size
   b) Shape
   c) Arrangement
   d) Cell Wall
   e) Capsule
   f) Pili and flagella.
   g) Nucleoid.

UNIT – II (12 Hours)

1. Significance of bacteria (Brief outline of each in 100 words)
   a) Spirochetes
   b) Azospirillum
   c) Rhizobium
   d) E. coli
   e) Salmonella typhi
   f) Vibrio cholerae
   g) Mycobacterium
   h) Mycoplasma
   i) Streptococcus
   j) Staphylococcus
   k) Clostridium
   l) Cyanobacteria
   m) Methanogens.
   n) *Streptomyces* .
2. Bacterial reproduction
   a) Transverse binary fission
   b) Fragmentation
   c) Spore formation.
3. Bacterial Growth.
   a) Typical growth curve
   b) Measurement of growth
   c) Batch and continuous culture

UNIT – III (12 Hours)

Microbiological methods

1. Sterilization
   a) Moist heat
   b) Dry heat
   c) Radiation
   d) Filtration
2. Medium Preparation
   a) Liquid, solid and semi – solid media.
   b) Chemically - defined medium
   c) Complex medium
   d) Enriched and selective media.
3. Inoculation
4. Incubation
5. Pure culture methods.
   a) Streak plate
   b) Spread plate
   c) Pour plate
6. Preservation of pure culture
7. Gram staining

UNIT – IV (12Hours)

1. General characteristics of viruses
2. Symmetry in animal and plant viruses
   a) Icosahedral
   b) Helical
   c) Complex
3. Structure of T_4 bacteriophage
4. Lytic and Lysogenic cycle in bacteriophages.
5. Interferon

UNIT – V (12 Hours)

Causative organism, Mode of infection, Symptoms and Control of the following diseases.

a) Typhoid
b) Cholera
c) Diphtheria
d) Infectious hepatitis
e) Measles
f) Small pox (Self study)
g) Chicken pox (Self study)
h) AIDS.

REFERENCE BOOKS:

1) Atlas, R.M. 1997. Principles of Microbiology, Second Edition, WCB. McGraw- Hill
2) Black, J.G. 1999. Microbiology, Principles and Exploration, 4th Edition, Prentice Hall International, Inc. New Delhi
3) Park, K. 1997. Text book of Preventive and Social Medicine, 15th Edition, Banarsidas Bhanot Publishers.
4) Pelczar, Jr, M.J. Chan, E.C.S., Krieg, N.R. 2004. Microbiology. Tata McGraw- Hill Publishing Co. New Delhi
5) Prescott, L.M., Harley, J.P and Klein D.A. 2006. Microbiology, W.C. Brown Publishers.

14ZOU19 BIOTECHNOLOGY – I (60 Hours) FIFTH SEMESTER

OBJECTIVES

1. To make the students understand the various techniques and principles involved in genetic- engineering
2. To make the students understand the applications of biotechnology in animal and human welfare.

UNIT – I (12 Hours)

1. Scope, importance and history of Biotechnology
2. Basic requirements: Electrophoresis – Spectroscopy – Polymerase Chaín Reaction
3. Cutting and joining of DNA: Enzymes used in genetic engineering – Use of linkers and adaptors

UNIT – II (12 Hours)

1. Cloning vectors: Bacterial plasmids – Bacteriophage vectors – Cosmids – Yeast plasmid vectors – Plant and animal viruses as cloning vectors
2. Gene cloning in Prokaryotes: DNA library – Insertion of f DNA into vector

UNIT – III (12 Hours)

1. Transfer of r DNA into Bacteria
2. Selection of recombinants
3. Blotting techniques: Southern – Northern – Western – Dot Blot

UNIT – IV (12 Hours)

1. Gene cloning in eukaryotes: Plant cells – Animal cells
2. DNA sequencing
3. Genetic engineering for human welfare: Human peptide hormone genes – Human interferon genes – Genes for vaccines

UNIT – V (12 Hours)

Genetic engineering for human welfare:

1. Diagnosis of disease: DNA probe – Monoclonal antibodies
2. Gene therapy
2. DNA profiling (Fingerprinting)

REFERENCE BOOKS:

1. Dubey, R.C. 2007. A Textbook of Biotechnology. S. Chand & Co. New Delhi
2. Gupta, P.K. 2008. Elements of Biotechnology. Rastogi Publications, Meerut
3. Old, R.W. and Primrose, S.B. 1989. Principles of gene manipulation. An introduction to genetic engineering. 4th edition. Oxford Blackwell, UK
4. Ranga M.M., 2001, Animal Biotechnology, Agrobios(India), Jodhpur.

14ZOU20 CORE ELECTIVE – I: ECONOMIC ZOOLOGY – I (60 Hours)
V SEMESTER

OBJECTIVES

1. To make the students understand the various methods and principles involved in Ornamental fish breeding and Sericulture
2. To make the students aware of the domestic market for the products and by-products of Ornamental fish breeding and Sericulture

ORNAMENTAL FISH BREEDING

UNIT – I (12 Hours)

1. Setting up of Aquarium (Construction of tank, Biological filter, Aerator and Hood).
2. Ornamental plants.
3. Morphology and varieties of freshwater ornamental fishes:
   a) Live bearers
   b) Fighter
   c) Gourami
   d) Goldfish
   e) Barbs
   f) Tetras
   g) Cichlids

UNIT – II (12 Hours)

1. Mass culture of live feed organisms:
   a) Infusoria
   b) *Chironomous* larva
   c) Artemia
   d) Spirulina
2. Artificial feed preparation.
3. Breeding methods of:
   a) Gold fish
   b) Angel fish
4. Brief account on ornamental fish diseases.

SERICULTURE

UNIT – III (12 Hours)

1. Species of silkworm.
2. **Morphology of mulberry plant (Self study)**
3. A brief account of mulberry varieties and propagation by cuttings (Self study)
4. Mulberry diseases and pests:
   Causative agent, symptoms and management of:
   a) Root rot
   b) Powdery Mildew
   c) Tukra

UNIT – IV (12 Hours)

1. Morphology of Mulberry silkworm:
   a) Egg
   b) Larva
   c) Pupa
   d) Adult
2. Silkworm seed production
3. **Rearing young age silkworms (Self study)**
4. **Rearing late - age silkworms. (Self study)**

UNIT – V (12 Hours)

1. Silkworm diseases
   (a) Pebrine
   (b) Flacherie
   (c) Grasserie
2. Silkworm pest:
   a) Uzi fly – A brief account of life cycle and management.
3. Cocoon types.
4. Shell ratio, Renditta and Price fixation.
5. Cocoon marketing.
6. A brief account on reeling processes.

REFERENCES

1. Jameson.J.D and Santhanam.R .1996 Manual of ornamental fishes and farming techniques, Fisheries college, Tuticorin
2. Dick Mills & G.Vevers. The practical encyclopedia of freshwater tropical aquarium. Salamander Books Ltd. London
3. Axelrod ,H.R and Shulty L.P Handbook of tropical aquarium fishes. T.F.H Publications , U.S.A
4. Krishnasamy, S. New technology of silkworm rearing. Central Sericulture Research & Training Institute, Mysore.
5. Krishnasamy, S. Mulberry cultivation in south India Central Sericulture Research & Training Institute, Mysore
6. Madan Mohan Rao, 1998, A Textbook of Sericulture. B.S. Publishers, Hyderabad.
7. Yoshemaro Tanaka. Sericology. Central Silk Board, Bombay.

14ZOU21 **GENETICS (65 Hours)** **V SEMESTER**

OBJECTIVES

This syllabus makes the students to:

1. Know about the inheritance and function of genes

UNIT – I (13 Hours)

Mendel's experiments:

1) Law of Dominance
2) Law of segregation
3) Law of Independent assortment
4) Incomplete Dominance
5) Co-dominance

UNIT – II (13 Hours)

1) Interaction of genes
   a) Complementary factors
   b) Inhibitory factors
   c) Supplementary factors
2) Multiple Alleles
   a) Blood groups (ABO, Rh, MN)
3) Polygenic inheritance

UNIT – III (13 Hours)

1) Linkage and crossing - over
2) Sex determination in man(**self study**)
3) Sex - linked inheritance in man
4) Extra chromosomal inheritance

UNIT – IV (13 Hours)

1) Chromosomal aberrations
2) Syndromes:
   a. Turner's syndrome
   b. Down's syndrome
   c. Klinefelter's syndrome
3) Barr body

UNIT – V (13 Hours)

1) Inborn - errors of metabolism
2) Sickle cell anemia
3) Inbreeding and out breeding.
4) Eugenics and Euthenics(**self study**)
5) Hardy-Weinberg Law.

REFERENCES

1. Agarwal V.K. and Verma P.S. 1997. Genetics. S. Chand & Co. New Delhi
2. Gardener, E.J, 1976, Principles of Genetics.
3. Duraisamy D & Hussain MS, 1998. Introduction to Genetics. Janshi Publications.

14ZOU22 BIOTECHNOLOGY – II (60 Hours) VIv SEMESTER

OBJECTIVES

1. To make the students understand the various techniques and principles involved in genetic-engineering
2. To make the students understand the applications of biotechnology in animal and human welfare.

UNIT – I (12 Hours)

1. Requirements of animal cell culture: Substrate – culture media - equipments
2. Isolation of animal tissue: Disaggregation of tissue – Primary cell culture – Secondary cell cultures and cell lines
3. Cultivation of animal cells in Bioreactors

UNIT – II (12 Hours)

1. Products from cell culture: Tissue plasminogen activator – Blood factor VIII - Erythropoietin
2. Transgenic animals
3. Molecular markers

UNIT – III (12 Hours)

1. Requirements for *invitro* culture of plant cells
2. Types of culture of plant materials: Explant culture – Callus culture – Shoot culture and micro propagation – Cell culture – Protoplast culture – Protoplast fusion and somatic hybridization
3. Transgenic plants(**self study**)

UNIT – IV (12 Hours)

1. Cryopreservation
2. Fermentation: Basic design of a fermenter – Microbial products – Downstream processing – Strain improvement of microorganisms
3. Primary metabolities: Vitamin B12 – Citric acid - Ethanol
4. Secondary metabolities: Antibiotics

UNIT – V (12 Hours)

1. Single cell protein: Microbes – Substrates – Nutritional value – Spirulina - Yeast
2. Biofertilizers(**self study**)
3. Enzyme Biotechnology: Microorganisms producing enzymes – Method of production – Immobilisation – Applications of enzymes

REFERENCE BOOKS:

1. Dubey, R.C. 2007. A Textbook of Biotechnology. S. Chand & Co. New Delhi
2. Gupta, P.K. 2008. Elements of Biotechnology. Rastogi Publications.Meerut
3. Old, R.W. and Primrose, S.B. 1989. Principles of gene manipulation. An introduction to genetic engineering. 4th edition. Oxford Blackwell.
4. Ranga M.M., 2006, Animal Biotechnology, Agrobios(India), Jodhpur.

14ZOU23 IMMUNOLOGY (60 Hours) VI SEMESTER

OBJECTIVES

This syllabus makes the students to:
Know about the structure and functions of immune systems of man

UNIT – I (12 Hours)
1. Introduction
2. Immunity: Innate and Acquired
3. Lymphoid organs: Primary - Secondary
4. Cells of immune system

UNIT – II (12Hours)
1. Antigens
2. Immunoglobulins
3. Immune response
4. Antigen – Antibody reactions

UNIT – III (12 Hours)

1. Major Histocompatibility complex in man
2. Hypersensitivity
3. Tumour immunology
4. Autoimmune diseases

UNIT – IV (12 Hours)
1. Immunity to infections(**self study)**
2. Transplantation immunology
3. Immunodeficiency diseases
4. Immunoprophylaxis

UNIT – V (12 Hours)
1. Antibody synthesis
2. Immunological techniques: Simple immunodiffusion – Immunoelectrophoresis – ELISA – HLA Typing

REFERENCE BOOKS:
1. Fatima,D and Arumugam, 2008. Immunology, Saras Publication, Nagercoil
2. Ashim K Chakravarthy, 2004. Immunology, Tata McGraw Hill, New Delhi
3. Ivan M Roitt *et al*., 2001, Immunology, London English Language Book Society.

14ZOU24 CORE ELECTIVE – II: ECONOMIC ZOOLOGY - II (60 Hours)
VI SEMESTER

OBJECTIVES

1. To make the students understand the various methods and principles involved in Apiculture and Poultry farming
2. To make the students aware of the domestic market for the products and by-products of Apiculture and Poultry farming

APICULTURE:

UNIT-I (12 Hours)

1. Types of honey bees: Rock bee – Little bee – Dammer bee – Indian bee – Italian bee.
2. Honey bee family – Structure ,Sex determination and functions of : Queen bee – Worker bee – Drone
3. Rearing appliances
    a) Bee hives : Newton hive – Langstroth hive – BIS hive – Transport hive
    b) Comb foundation sheet
    c) Smoker
    d) Bee veil ,
    e) Honey extractor

UNIT-II (12 Hours)

1. Pollen and nectar yield plants.
2. Inspection of bee hives
3. Maintenance during dearth period
4. Natural enemies of honey bee: Wax moth, Yellow banded wasp (Self study)
5. Products of Apiculture (Self study)

POULTRY FARMING:

UNIT –III (12 Hours)

1. Poultry housing
2. The deep litter system.
3. Cage rearing
4. Debeaking.
5. Poultry feed

UNIT –IV (12 Hours)

A brief account of diseases of Poultry.

1. Viral diseases:
a) Ranikhet
b) Chicken pox
2. Bacterial diseases:
a) Fowl cholera
b) Salmonelloses
3. Fungal diseases:
a) Aspergillosis
b) Aflotoxicosis
4 Animal parasites:

a) Coccidiosis
b) Worm infections
c) Ticks and Mites

5. Vaccination programme and methods

UNIT –V (12 Hours)

Egg quality
Egg grading
Storage and preservation of eggs.
Egg Marketing
Hatchery

REFERENCES

1. Ghosh,G.K., 1994. Beekeeping in India, Ashish Publishing House, New Delhi.
2. Phillips, E.P., 2001, Beekeeping, Agrobios (India), Jodhpur.
3. Mishra,R.C., 2002. Perspectives in Indian Apiculture,Agrobios (India), Jodhpur.
4. Winston,M.L, 1991. The Biology of the honey bee. Harward University Press, Cambridge.
5. Biester, H.E . 1989. Diseases of Poultry. Oxford and IBH.
6. Gnanamani. M.R. 2003.Modern aspects of commercial Poultry keeping. Giri Publications, Madurai.
7. Jull, M.A. 1972.Poultry husbandry. Tata McGrawHill.

14ZOU25 **EVOLUTION (65 Hours)** **VI SEMESTER**

OBJECTIVES

This syllabus makes the students to:

1. Understand the basic principles of evolution and the various courses which bring about the evolution of life.

UNIT – I (13 Hours)

1. Introduction- Historical account, Concept of evolution
2. Origin of life: Abiogenesis-Biogenesis-Biochemical origin of life
3. Evidences of evolution: Comparative anatomy, Embryological and Physiological

UNIT – II (13 Hours)

Lamarckism and Neo-Lamarckism
Darwinism and Neo-Darwinism
Fossils and Geological time table

UNIT – III (13Hours)

Variation: Definition- Types of variation and sources of variation
Isolating mechanisms
Speciation

UNIT – IV (13 Hours)

1. Convergent evolution
2. Parallel evolution
3. Adaptive radiation
   a) Definition
   b) Causes of Adaptive radiation
   c) Significance
   d) Adaptive radiation in Darwin's finches

UNIT – V (13 Hours)

1. Evolution of Man
   a) Organic evolution
   b) Cultural evolution and future evolution
2. Zoogeographical regions(**self study)**

REFERENCES

1.Arumugam N, 2002. Essentials of Evolution. Saras Publication.
2.Agarwal, V.K.& Verma, P.S. 1998 . Organic Evolution. S. Chand & Co. New Delhi.

14ZOU26 MAJOR PRACTICAL – III V & VI SEMESTERS

1. ABO and Rh Blood grouping in man
2. Observation of *Drosophila* morphology
3. Qualitative study of carbohydrates
4. Qualitative study of proteins and amino acids.
5. Quantitative determination of total carbohydrate content in a sample.
6. Quantitative determination of total protein content in a sample.
7. Estimation of oxygen consumption by a fish.
8. Estimation of hemoglobin percentage of human blood.
9. Preparations of human blood smear.
10. Total count of RBC in human blood.
11. Total count of WBC in human blood.
12. Preparation of haemin crystals from human blood.
13. Qualitative detection of excretory products.
14. Qualitative detection of glucose and albumin in urine.
15. Examination of marine water planktons.
16. Examination of freshwater planktons.
17. Estimation of dissolved oxygen in water samples by Winkler's method.
18. Estimation of salinity of water samples.
19. Estimation of pH of water samples using pH paper and pH meter.
20. Examination of fossils.
21. Observation of bacteria by hanging- drop preparation
22. Sterilization techniques.
23. Medium preparation.
24. Isolation of bacteria from soil.
25. Gram staining of bacteria.
26. Demonstration of DNA isolation.
27. Demonstration of gel electrophoresis.
28. Visit to a Biotechnology centre.

INSTRUCTIONS TO CANDIDATES
CE PRACTICAL EXAM

Major Practical III will be conducted at the end of the III year. Candidates without bonafide record and 75% of attendance will not be permitted for the practical examination.

14ZOU27 MAJOR PRACTICAL – IV V & VI SEMESTERS

1. Morphology of a mulberry plant.
2. Identification of different diseases of mulberry leaves as studied in theory.
3. Vegetative propagation of mulberry
   a) Stem grafting
   b)Bud grafting
4. Study of rearing appliances
5. Dissection and display of silk gland from silkworm larva.
6. Determination of shell ratio percentage
7. Determination of Denier size and estimation of Renditta.
8. Study of diseases of silkworm larva: Pebrine, Grasserie, Flacherie.
9. Pest of silkworm larva: Uzi fly life cycle and management.
10. Rearing of mulberry silkworm.
11. Visit to TN Sericulture Board
12. Demonstration of double immunodiffusion
13. Demonstration of immunoelectrophoresis
14. Separation of lymphocytes using centrifuge
15. Structural adaptations of Queen, Worker, Drone of Indian Bee.
16. Structure of Bee hive.
17. Observation of poultry rearing appliances.
18. Model plan for poultry house.
19. Visit to a Poultry Farm and Fish Breeding Centre.
20. Setting up of Aquarium
21. Identification of ornamental fishes

INSTRUCTIONS TO CANDIDATES

CE PRACTICAL EXAM

Major practical IV will be conducted at the end of the sixth semester. Candidates without bonafide record and 75% of attendance will not be permitted for the practical examination.

14BOU03 **ZOOLOGY – I (50 Hours)** **I SEMESTER**

(For BSc Botany Major)

OBJECTIVES

1. To acquire knowledge of fundamental principles of different phyla
2. To gain thorough knowledge of the diagnostic and adaptive features of Invertebrate animals.

UNIT – I (10 Hours)

1. General characters of Invertebrata and Outline classification up to the level of Phyla with salient features and an example for each Phylum.
2. General characters and Outline classification of Chordata up to the level of and classes with salient features and an example for each class.

UNIT – II (10 Hours)

1. Structure and life-history of:

a) Obelia

b) Taenia solium.

UNIT – III (10 Hours)

1. Morphology, anatomy and life-history of:
   a) Penaeus
2. Morphology and organization of Starfish.

UNIT – IV (10 Hours)

1. Morphology and organ systems of Shark and Frog (excluding endoskeleton).

UNIT – V (10 Hours)

1. Morphology and organ systems of Pigeon and Rabbit (excluding endoskeleton).

REFERENCE BOOKS:

1. Ayyar, E.K. and Ananthakrishnan .T.N, 2007, Outlines of Zoology Vol.I and Vol. II. S.Viswanathan (Printers & Publishers), Pvt Ltd.,Madras.
2. Kotpal,R.L. 2008, Modern Text Book of Zoology Vertebrates, Rastogi Publications, Meerut
3. Nair, N.C. et al., 2008, A Text book of Invertebrates . Saras Publication. Nagercoil
4. Thangamani, A, et al. 2008, A Text book of Chordates. Saras publication. Nagercoil

14BOU06 **ZOOLOGY – II (50 Hours)** **II SEMESTER**

(For BSc Botany Major)

OBJECTIVES

1. To acquire knowledge of Agricultural pests
2. To gain knowledge of the silkworm rearing techniques

UNIT – I (10 Hours)

1. General characters of class Insecta.
2. Classification of class Insecta up to the level of orders with salient features and an example for each order.

UNIT – II (10 Hours)

1. Morphology, life-history, destruction caused and control measures of:
   a) Rice Pests: *Tryporyza incertulas, Orseolia oryzae.*
   b) Sugarcane Pests: *Chilo infuscatellus, Chilo sacchariphagus.*
   c) Cotton Pests: *Earias sp. , Pectinophora gossypiella.*

UNIT – III (10 Hours)

1. Methods of pest management.
2. Pesticides and their classification
3. Pesticide application methods.

UNIT – IV (10 Hours)

1. Morphology of mulberry plant
2. A brief account of mulberry varieties
3. Propagation of mulberry
4. Pests and diseases of mulberry: Powdery Mildew, Tukra, Leaf webber

UNIT – V (10 Hours)

1. Silkworm species.
2. Morphology and life-cycle of *Bombyx mori.*
3. Silkworm rearing methods and appliances.
4. Diseases of silkworm: Pebrine, Flacherie, Grasserie.

REFERENCE BOOKS:

1. Madan Mohan Rao, 2007 A Text Book of Sericulture. B.S. Publications Hyderabad.
2. Vasantharaj David, B. and Kumaraswami. T.1982, Elements of Economic Entomology, Popular Book Depot, Madras.
3. Kotpal,R.L. 2007, Modern Text Book of Zoology Invertebrates., Rastogi Publications, Meerut.

14BOU08 **ZOOLOGY (Allied) PRACTICAL**
I & II SEMESTER
(For BSc Botany Major)

1. Identification, classification and comments on:
   Paramecium – Entire, *Obelia colony, Obelia medusa.*
   Taenia solium- Entire, Scolex, Cysticercus larva(bladder worm
2. Identification, classification and comments on:
   Penaeus- Entire, Nauplius larva, Protozoea larva, Zoea larva, Mysis larva.
3. Identification, classification and comments on:
   Starfish, Shark, Pigeon and Rabbit
4. Mounting of mouth parts of cockroach.
5. Dissection of digestive system of cockroach
6. Dissection of nervous system of cockroach
7. Dissection of reproductive system of cockroach
8. Mounting of scale of a fish
9. Dissection of digestive system of a marketable fish – Demonstration only
10. Observation of morphology of mulberry plant.
11. Identification and study of mulberry varieties : MR-2, Kanva-2 , Palladam local, S36, S54 and V1
12. Study of morphology and life -cycle of *Bomby mori*.
13. Study of rearing appliances of silk-worm.
14. Determination of shell ratio percentage.
15. Determination of Denier size and Renditta.

INSTRUCTIONS TO CANDIDATES

CE PRACTICAL EXAM

Candidates should maintain a record containing illustrations and notes. Bonafide record should be submitted for the Comprehensive Examination. Candidates without bonafide record and 75% attendance will not be permitted for the practical examination.

14BCV03 IDC GENERAL BIOLOGY (50 Hours) I SEMESTER

(For BSc Biochemistry Major)

OBJECTIVES

1. To understand the biology of endoparasites in man
2. To make the students understand the mechanism of heredity
3. To make the students aware of environmental degradation

UNIT – I (10 Hours)

1. Study of Morphology, life-cycle, disease caused and control measures of:
   a) Entamoeba histolytica b) Plasmodium vivax
   c) Taenia solium d) Ascaris lumbricoides

UNIT – II (10 Hours)

1. Structure and types of chromosome.
2. Chromosomal aberrations
3. Syndromes :
   a) Turner's syndrome
   b) Down's syndrome
   c) Klinefelter's syndrome
4. Barr-body
5. Linkage and crossing-over

UNIT – III (10 Hours)

1. Inheritance of:
   a) Blood groups in man(ABO, MN and Rh factor)
   b) Colour blindness and Hemophilia in man
   c) Skin colour in man.
2. Extrachromosomal inheritance.

UNIT – IV (10 Hours)

1. Inborn- errors of metabolism
2. Sickle -cell anemia
3. Inbreeding and Out breeding
4. Eugenics and Euthenics

UNIT – V (10 Hours)

1. Pond ecosystem
2. Water pollution
3. Air pollution
4. Conservation of Natural resources: Water, Forest, Wildlife and Energy.

REFERENCE BOOKS:

1. Ayyar, E.K. and Anananthakrishnan, T.N, 2007. Outlines of Zoology, Viswanathan (Printers & Publishers), Pvt.Ltd. Madras
2. Verma, P.S and Agarwal, V.K.,2008. Genetics. S. Chand & Company, New Delhi
3. Veerbala Rastogi and Jayaraj. M.S., 1990. Animal ecology and distribution of animals. Kedarnath Ramnath Publications, New Delhi

14BCV05 **BIOLOGY PRACTICAL** **I SEMESTER**

(For BSc Biochemistry Major)

1. Examination of parasites:
   a) *Entamoeba, Plasmodium, Taenia solium* entire, scolex and cysticercus larva
   b) *Ascaris* male and female.
2. Estimation of hemoglobin percentage of human blood.
3. Preparations of human blood smear.
4. Blood grouping in man (ABO and Rh)
5. Mounting of haemin crystals of human blood.
6. Estimation of O_2 content of water samples.
7. Estimation of salinity of water samples.
8. Estimation of pH of water samples using pH papers.

INSTRUCTIONS TO CANDIDATES

CE PRACTICAL EXAM

Candidates should maintain a record containing illustrations and notes. Bonafide record should be submitted for the comprehensive examination. Candidates without bonafide record and 75% attendance will not be permitted for the practical examination.

14EDCZOU EDC-ORNAMENTAL FISH KEEPING V SEMESTER
(Cluster – III)

OBJECTIVES

To enable the students to:

1. Gain knowledge about Ornamental fishes.
2. Develop skill in rearing, breeding and marketing of freshwater ornamental fishes.

Unit –I (10 Hours)

1. Introduction.
2. Setting up of tank.
3. Accessories: Hood, Light source, Aerator and Filters
4. Water quality management
5. Ornamental plants.

Unit – II (10 Hours)

1. Morphology and varieties of freshwater ornamental fishes:
   Live bearers, Fighter, Gourami, Goldfish, Barbs
   Tetras and Cichlids
2. Brood stock management.
3. Live feed organisms:
   Infusoria
   Daphnia
4. Artificial feed preparation

Unit – III (10 Hours)

1. Breeding methods of: Gold fish and Angel fish
2. Brief account on ornamental fish diseases.
3. Packing and transportation of live fishes.

Text Book

1. Jameson.J.D and Santhanam.R .1996 Manual of ornamental fishes and farming echniques, Fisheries College, Tuticorin