KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
COIMBATORE – 641 029

Course Name: **B.Sc., ZOOLOGY**

Curriculum and scheme of Examination under CBCS

(Applicable to students Admitted from the Academic Year **2016 - 2017** onwards)

Scheme of Examinations (With 4 Sem Language Papers)

Semester	Part	Subject Code	Title of the Paper	Instruction hours/cycle	Exam. Marks			Duration of Exam (hours)	Credits
					CIA	ESE	TOTAL		
I	I	16TML101	Language I@	6	25	75	100	3	3
	II	15ENG101	English –I	6	25	75	100	3	3
	III	15UZO101	Core 1–Non-Chordata	7	25	75	100	3	5
	III	15UZO1I1 15UBO1A1	Allied 1- Sericulture I / Botany I	5	20	55	75	3	4
			C.Pr. 1- Non Chordata and Chordata	2	-	-	-	-	-
			Allied Pr. 1. Sericulture	2	-	-	-	-	-
	IV	15EVS101	Environmental Studies**	2	-	50	50	3	2
II	I	15TML202	Language II@	6	25	75	100	3	3
	II	15ENG202	English –II	6	25	75	100	3	3
	III	15UZO202	Core 2–Chordata	7	25	75	100	3	5
	III	15UZO2I2 15UBO2A2	Allied 2- Sericulture II / Botany II	5	20	55	75	3	4
		15UZO2CL	C.Pr. 1- Non Chordata and Chordata (Based on core subjects I & II semesters)	2	40	60	100	3	2
		15UZO2IL 15UBO2AL	Allied Pr. 1. Sericulture / Botany	2	20	30	50	3	2
	IV	15VED201	Value Education- Moral and Ethics **	2	-	50	50	3	2
III	I	15TML303	Language III@	6	25	75	100	3	3
	II	15ENG303	English –III	6	25	75	100	3	3
	III	15UZO303	Core 3– Physiology	5	25	75	100	3	5
	III	15UBC 3A3	Allied 3- Biochemistry	5	20	55	75	3	4
			C.Pr. 2- Physiology and Cell Biology	2	-	-	-	-	-
			Allied Pr. 2. Biochemistry	2	-	-	-	-	-
	IV	15UGA3S1	Skill Based subject 1- General Awareness	2	25	75	100	3	3
	IV	15TBT301/ 15TAT301/ 15UHR3N1	Basic Tamil* / Advanced Tamil** (OR) Non-major elective- I**- Human	2	-	75	75	3	2

			rights						
IV	I	16TML404	Language IV@	6	25	75	100	3	3
	II	16ENG404	English –IV	6	25	75	100	3	3
	III	15UZO404	Core 4– Cell Biology	5	25	75	100	3	5
	III	15UBC4A4	Allied 4- Biochemistry	5	20	55	75	3	4
		15UZO4CM	C.Pr. 2- Physiology and Cell Biology	2	40	60	100	3	2
		15UBC4AL	Allied Pr. 2. Biochemistry	2	20	30	50	3	2
	IV	15UZO4S2	Skill Based subject 2- Health education	2	25	75	100	3	3
	IV	15TBT402/ 15TAT402/ 15UWR4N2	Basic Tamil* / Advanced Tamil** (OR) Non-major elective- II**- Women's rights	2	-	75	75	3	2
V	III	15UZO505	Core 5- Genetics	5	25	75	100	3	4
	III	15UZO506	Core 6-Biotechnology-I	5	25	75	100	3	4
	III	**16UZO507**	**Core 7–Ecology**	**5**	**25**	**75**	**100**	**3**	**4**
	III	**16UZO508**	**Core 8–Biostatistics, Biophysics and Bioinformatics**	**5**	**25**	**75**	**100**	**3**	**4**
			C.Pr.3: based on CP 5,7,8,11,12	2	-	-	-	-	-
			C.Pr.4: Based on CP 6,9,10	2	-	-	-	-	-
	III	15UZO5E1	Major Elective -1	4	25	75	100	3	5
	IV	**16UBC/UBT /UBO – 5X1**	**EDC-Extra Departmental Course**	**2**	**25**	**75**	**100**	**3**	**3**
		15UZO5IT	**Internship**						**Grade**
VI	III	15 UZO609	Core 9 –Microbiology and Immunology	4	25	75	100	3	4
	III	15 UZO610	Core 10 - Biotechnology-II	5	25	75	100	3	4
	III	15 UZO611	Core 11 –Developmental Biology	5	25	75	100	3	4
	III	**16 UZO612**	**Core 12 – Animal diversity**	**4**	**25**	**75**	**100**	**3**	**4**
		15UZO 6CN	C.Pr.3: based on CP 5,7,8,11,12	2	40	60	100	3	2
		15UZO 6CO	C.Pr.4: based on CP 6,9,10	2	40	60	100	3	2
	III	15UZO6E2	Major Elective 2	3	25	75	100	3	5
	III	15UZO6Z1	**Project**	**3**	**20**	**80**	**100**	**3**	**5**
	IV	15UZO6S4	Skill Based subject-4 Commercial fish culture	2	25	75	100	3	3
	V	15NCC/NSS/ YRC/ PYE101	Extension Activities*	-	50	-	50	-	1

			Total	**180**			**3800**		**140**

@ Hindi/Malayalam/ French/ Sanskrit – 12HIN/MLM/FRN/SAN101 - 202

***** - No End-of-Semester Examinations. Only Continuous Internal Assessment (CIA)

******- No Continuous Internal Assessment (CIA). Only End-of-Semester Examinations (ESE)

*** Project Report – 60 marks; Viva voce – 20 marks; Internal – 20 marks

**** The students shall undergo an internship training / field work for a minimum period of 2 weeks at the end of the fourth semester during summer vacation and submit the report in the fifth semester. The report will be evaluated for 100marks alone with the internal viva voce by the respective faculty. According to their, the grades will be awarded as given below.

Marks %	Grade
85-100	O
70-84	D
60-69	A
50-59	B
40-49	C
<40	U (Reappear)

Major Elective Papers

(2 papers are to be chosen from the following 6 papers)

1. Economic Zoology

2. Pest & their Management

3. Vermitechnology

4. Wild life conservation & Management

5. Poultry science & management

6. Human genetics &Counselling

Non-Major Elective Papers

1. Human Rights

2. Women's Rights

Extra Departmental Course (EDC)

1. Diagnostic Biochemistry –Biochemistry Department

2. **Medicinal botany and Human Welfare-Botany Department**
3. **Molecular Diagnostics- Biotechnology Department**

Note: In core/ allied subjects, no. of papers both theory and practical are included wherever applicable. However, the total credits and marks for core/allied subjects remain the same as stated below

Tally Table:

S.No.	Part	Subject	Marks	Credits
1.	I	Language – Tamil/Hindi/Malayalam/ French/ Sanskrit	400	12
2.	II	English	400	12
3.	III	Core – Theory/Practical/Project	1700	65
		Allied	400	20
		Electives	200	10
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major elective	150	4
		Skill Based subject	400	12
		Environmental Studies	50	2
		Value Education	50	2
5.	V	Extension Activities NCC/NSS/YRC/PYE	50	1
		Total	**3800**	**140**

.

Note:

CBCS – Choice Based Credit system
CIA – Continuous Internal Assessment
ESE – End of Semester Examinations

25 % CIA is applicable to all theory subjects except JOC, COP and Diploma Courses, which are considered as extra credit courses.

UZO 1

15UZO101

I - SEMESTER

CORE PAPER 1 – NON-CHORDATA

TotalCredits:5 **Total Hours: 105**

Objectives

1. To make the students develop a comprehensive knowledge on the classification and characteristics of Non - Chordata.
2. To make the students understand the morphological and anatomical features of important non-chordate animals.
3. To make the students to know about the parasites (clinical and economic importance).

UNIT I **21Hrs**

Phylum Protozoa: Classification and characters up to Classes with suitable examples.

Type study : Paramecium

General Topic : Parasitic protozoa

Phylum Porifera

Type study : Leucosolenia
General Topic : Canal system in sponges

UNIT II **21Hrs**

Phylum Coelenterata: Classification and characters up to Classes with suitable examples.

Type Study : Obelia
General Topic : Coral reefs

Phylum Aschelminthes : Classification and characters up to Classes with suitable examples.

Type Study : Ascaris lumbricoides
General topic : Diseases caused, Symptoms and Control measures of parasitic Worms- Wuchereria bancrofti, Pin worms

UNIT III **21Hrs**

Phylum Platy helminthes

Type study : Fasciola hepatica
General topic : Parasitic adaptations

Phylum Annelida: Classification and characters up to Classes with suitable examples.

Type Study : Leech
General topics : Metamerism in Annelids, Vermicompost production by earthworms

UZO 2

UNIT IV **21Hrs**

Phylum Arthropoda: Classification and characters up to Classes with suitable examples.

Type study	:	Prawn (Penaeus sp)
General topic	:	Economical importance of Arthropodes

UNIT V **21Hrs**

Phylum Mollusca: Classification and characters up to Classes with suitable examples.

Type study	:	Pila globosa
General topics	:	Torsion in Gastropods, Economic importance of mollusks

Phylum Echinodermata: Classification and characters up to Classes with suitable examples.

Type study	:	Star fish
General topic	:	Larval forms of Echinoderms

Text Books

1. A Manual of Zoology - M. Ekambaranatha Iyer & Ananthakrishnan Vol I Part I& II, 1989 –S.Viswanathan Printers & publication Ltd.
2. Modern Text Book of Zoology – Invertebrata. R L Kotpal(2012), Rostagi pub.Meerut.
3. Invertebrate Zoology – Jordan, E. L & Verma, P. S. 2000. S. Chand & Co.

Reference Books

1. Barnes RD (1981) Invertebrate Zoology, Sounders college, Philadelphia.
2. Borradalle LA Potts Easthium LES & Saunders JJT (1963). The Invertebrates. Cambridge University Press.
3. Parker AJ & Haswell WA (1943) A Text Book of Zoology Vol I Mac-Millan
4. Dhami.P.S & Dhami J K. Invertebrate Zoology. S.Chand& Co., New Delhi (2009).
5. Kotpal RL. Agarwal S.K &Ketarpai RP (2008). Modern text book of Zoology – Invertebrates. Rastogi Publications, Meerut.
6. Ruppert, Edward E., Fox, Richard S. & Barnes, Robert D. (2009). Invertebrate Zoology : A functional Evolutionary Approach. 7th edition. Thomson Brooks / Cole.

15UZO1I1

I - SEMESTER

Allied A.1. SERICULTURE – I

Total Credits: 4 **Total Hours: 75**

Objectives

1. Introduce to create a self employment opportunity among students of both genders.
2. To equip the skills of rearing of silkworms and harvesting of cocoons.
3. To aware better breeding and grainage techniques.

UNIT I **15Hrs**

Introduction

Bombyx mori : Systematics, General organisation, lifecycle, Silk gland and silk formation. Origin and economic importance of sericulture industry. Mulberry and non-mulberry (Tasar, Eri & Muga) silk producing species, their distribution and food plants (Primary, Secondary & Tertiary).

UNIT II **15Hrs**

Silkworm rearing

Selection, location and orientation of rearing houses. Environmental conditions essential for rearing - temperature, humidity, ventilation and light - methods for providing optimum conditions. Different methods of rearing, quality of leaf required for different stages. Cleaning, spacing and frequency of feeding.Mounting of worms. Harvesting of cocoons.

UNIT III **15Hrs**

Silkworm pathology

Disinfection of rearing rooms and equipments - control and prevention of a. Flacherie b. Muscardine c. Grasserie and d. Pebrine. Insects injurious to silkworm larva, pupa and cocoons.

UNIT IV **15Hrs**

Silkworm Genetics

Genetic basis of variation in silkworm - multiple alleles in *Bombyxmori,* Sex-linked inheritance and mutation in *Bombyx mori.*

Breeding : Aims of silkworm breeding-Inbreeding and cross breeding - combining various qualities of races, maternal inheritance and its consideration in breeding.

UZO 4

UNIT V **15Hrs**

Grainage techniques: various grainage techniques - selection of seed cocoons - emergence of moths - preparation and treatment of layings - refrigeration of over -wintered eggs.

Text book

1. A text book of sericulture .M.Madan Mohan Rao(2008) B.S publications,Hyderabad.
2. An introduction to sericulture.G. Ganga &Sulochanachetty(2006) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

Reference books

1. Comprehensive Sericulture – Vol.2 Silkworm Rearing & Silk Reeling G. Ganga (2003) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Mulberry Cultivation, Sericulture Manual-I Dr. G. Rangaswami, Dr. Manjeet S. Jolly, FAO, UN IBH Publishing Co. Pvt. Ltd. New Delhi. (1998)
3. Moriculture. Kamal Jaiswal, Sunil P. Trivedi, B.N. Pandey, R.K. Khatri , APH Publishing Corporation, Ansari Road, Daryakanj. New Delhi 2009.
4. Rearing of silkworm and silkworm diseases by Mysore Silk Association, Bangalore. (1987).

UZO 5

15EVS101

Part IV – I SEMESTER

ENVIRONMENTAL STUDIES

Total Credits: 2 **Total Hours : 30**

Objectives

1. To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
2. To shape students into good "ecocitizens", thereby catering to global environmental needs.

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT 6 Hrs

1.1 Definition : scope and importance
1.2 **Need for public awareness***
1.3 Natural resources
1.3.1 Types of resources
Forest Resources – Water Resources – Mineral Resources – Food Resources – Energy Resources – Land Resources.

UNIT II ECOSYSTEMS 6 Hrs

2.1 Concept of an ecosystem
2.2 Structure and functions of an ecosystem
2.3 Producers, consumers and decomposers
2.4 Energy flow in the ecosystem
2.5 Ecological succession
2.6 Food chains, food web and ecological pyramids
2.7 **Structure and function of the following ecosystem***
Forest Ecosystem – Grassland Ecosystem – Desert Ecosystem – Aquatic Ecosystem.

UNIT III BIODIVERSITY AND ITS CONSERVATION 6 Hrs

3.1 Introduction – Definition – Genetic – Species and ecosystem diversity
3.2 Biogeographical classification of India
3.3 **Value of biodiversity***
3.4 Biodiversity at global, national and local levels
3.5 India as a mega – diversity Nation
3.6 Hot spot of biodiversity
3.7 Threats to biodiversity
3.8 Endangered and endemic species of India
3.9 Conservation of Biodiversity
insitu Conservation of Biodiversity – *exsitu* Conservation of Biodiversity

UZO 6

UNIT IV ENVIRONMENTAL POLLUTION 6 Hrs

4.1 Definition

4.2 Causes, effects and control measures of: Air Pollution – Water Pollution – Soil Pollution – Marine Pollution – Noise Pollution – Thermal Pollution – Nuclear Pollution.

4.3 Solid Waste Managements: causes, effects, control measures of urban and industrial wastes.

4.4 Role of individual in prevention of pollution*.

4.5 Pollution case studies – domestic waste water, effluent from paper mill and dyeing, cement pollution.

4.6 Disaster Management – Flood, Drought, Earthquake, Tsunami, Cyclone and Landslide.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT 6 Hrs

5.1 Sustainable Development

5.2 Urban problems related to energy

5.3 Water Conservation : Rain Water Harvesting and Watershed Management

5.4 Resettlement and rehabilitation of people, its problems and concerns, case studies – Narmatha Valley Project.

5.5 Environmental ethics, issues and possible solutions.

5.6 Climatic change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies – Hiroshima and Nagasaki, Chernobyl.

5.7 Consumerism and waste products

5.8 Environmental Protection Act

5.9 Air Pollution Act (Prevention and Control)

5.10 Water Pollution Act (Prevention and Control)

5.11 Wild Life Protection Act

5.12 Forest Conservation Act

5.13 Issues involved in enforcement of environmental legislation

5.14 Public awareness*

5.15 Human population and the environment

5.15.1 Population Growth and Distribution

5.15.2 Population Explosion – Family Welfare Programme*

5.15.3 Environment and Human Health

5.15.4 Human Rights*

5.15.5 Value Education*

5.15.6 HIV / AIDS*

5.15.7 Women and Child Welfare

5.15.8 Role of Information Technology in Environment and Human Health*.

*** Self Study (Questions may be asked from these topics also)**

Text Book

1. P.Arul, A Text Book of Environmental Studies, Environmental Agency, No 27, Nattar street, Velacherry main road, Velacheery, Chennai – 42, First Edition, Nov. 2004.

References

1. PurohitShammiAgarwal, A text Book of Environmental Sciences, Publisher Mrs. SaraswatiProhit, Student Edition, Behind Naswan Cinema Chopansi Road, Jodhpur.
2. Dr.Suresh and K.Dhameja, Environmental Sciences and Engineering, Publisher S.K.Kataria& Sons, 424/6, Guru Nanak Street, Vaisarak, Delhi – 110 006.
3. J.Glynn Henry and Gary W Heinke, Environmental Science and Engineering, Prentice Hall of India Private Ltd., New Delhi – 110 001.

*** Self Study (Questions may be asked from these portions also)**

Question Paper Pattern
(External only)

Duration: 3 hours TotalMarks : 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

UZO 8

15UZO202

II - SEMESTER

CORE PAPER 2 - CHORDATA

Total Credits: 5 **Total Hours: 105**

Objectives

1. To make the students develop a comprehensive knowledge on the classification and characteristics of major Chordata groups.
2. To make the students understand the morphological and anatomical features of important chordate animals.
3. To make the students appreciate general features, distribution and economic importance of Chordates.

Classification and characteristics. One type for each class to be studied in detail. All systems excepting endocrine system to be studied, with comparative account among the class.

UNIT I **21Hrs**

Prochordata: Classification and characteristics up to Classes with suitable examples

Type study	:	Amphioxus
General topic	:	Salient features and affinities of Prochordata.

Pisces: Classification and characteristics: Chondrichthyes, Osteichthyes (Crossopterigii, Dipnoi , Actinopterigii-teleostei)

Type study	:	Shark
General topics	:	Fishes available in Indian waters and their Economic importance.

UNIT II **21Hrs**

Amphibians: Classification and characteristics: (Labrynthodontia, Apoda, Urodela and Anura)

Type study	:	Frog
General topic	:	Parental care

UNIT III **21Hrs**

Reptilia: Classification and characteristics:(Anapsida, Euryapsida, Parapsida, Synapsida, Diapsida, Rhynchocephalia, Squamata and Crocodilia)

Type study	:	Calotes
General topics	:	Poisonous and non-poisonous snakes, Poison apparatus and snake venom.

UNIT IV **21 Hrs**

Aves: Classification and characteristics: (Archeornithes,Odontognathae, Palaognathae, Impennae and Neognathae)

Type study	:	Pigeon
General topic	:	Migrationin Birds.

UNIT V **21Hrs**

Mammals: Classification and characteristics: (Prototheria (Monotremata), Theria (Metatheria- Marsupalia) and Eutheria)

Type study	:	Rabbit
General topics	:	Dentition in Mammals (Rabbit & Human) Ruminent stomach

Text Books

1. Thangamani, A. Prasannakumar, S. Narayanan, L.M. Arumugam.N CHORDATES 2009, Saras Publication
2. R.L.Kotpal Morden - Text book of Zoology-VERTEBRATES. Edn.2012 Rastogi Publication. Meerut.

Reference Books:

1. Nigam. H.C. Zoology of Chordates. 1972. 5thEdn. S.Nagin& Co. Publishers, Delhi.
2. EL Jordan & P.S Verma 1965.Chordate Zoology & Elements of Physiology. Preeti, Meerut.
3. J.Z. Young 1981, The life of the vertebrates. 3 Edition. Oxford University Press. Great Britan.
4. William N. McFarland et al., Vertebrate Life(1980). Macmillan Publishing Co., Inc., New York.
5. Talwar, P.K., Jhingran, A.G. Inland fishes.1991. Vol.2. Oxford & 1BH publishing Co.Pvt.Ltd. New Delhi.

UZO 10

15UZO2I2

II - SEMESTER

Allied A-2 - SERICULTURE –II

Total Credits: 4 **Total Hours: 75**

Objectives

1. To do Sericulture and Moriculture is essential to provide feed to silkworms.
2. To develop skills about quality and processing of cocoons.
3. To aware of reeling and byproducts of reeling for other industrial development.

UNIT I **15Hrs**

Moriculture: Distribution of varieties of mulberry - Climatic and other conditions for its growth - selection of land for cultivation. Different methods of cultivation - sexual and vegetative methods - merits and demerits.

UNIT II **15Hrs**

Weeds and weeding - pruning methods - dormancy in mulberry – manuring. Insects injurious to the mulberry gardens - bacterial and fungal diseases of mulberry.

UNIT III **15Hrs**

Silk reeling: Origin and importance of reeling industry. Selection of Raw material (cocoons). Importance of quality of cocoons - physical and commercial characteristics of cocoons - defective cocoons. Cocoons testing and classification- price fixation of raw materials.

UNIT IV **15Hrs**

Processing of raw materials: Stiffling and condition of cocoons - storage – sorting - riddling of cocoons. Boiling of cocoons - Different methods - Brushing of cocoons - Reeling techniques: Reeling equipments. Comparative study of various equipments - Charka ,cottage basins, multi end basins - automatic reeling machines.

UNIT V **15Hrs**

Importance of water in reeling. Raw silk examination - Lacing and skeining - Byproducts of reeling. Filature management: Layout of a filature - sections of a modern filature

UZO 11

Text books

1. A text book of sericulture. M.Madan Mohan Rao (2008) B.S publications Hyderabad.
2. An introduction to sericulture. G. Ganga & Sulochanachetty (2006) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

Reference books

1. Comprehensive Sericulture–Vol.2 Silkworm Rearing & Silk Reeling G. Ganga (2003) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Mulberry Cultivation, Sericulture Manual-I Dr. G. Rangaswami, Dr. Manjeet S. Jolly, FAO, UN IBH Publishing Co. Pvt. Ltd. New Delhi. (1998)
3. Moriculture. Kamal Jaiswal, Sunil P. Trivedi, B.N. Pandey, R.K. Khatri , APH Publishing Corporation, Ansari Road, Daryakanj. New Delhi 2009.
4. Rearing of silkworm and silkworm diseases by Mysore Silk Association, Bangalore (1987).

15UZO2CL

CORE PRACTICAL – I – NON-CHORDATA AND CHORDATA

Total Credits : 2

Experiment I:

Dissection & Compound Microscope: Observation of different parts. Explain structure and functions of each part with suitable diagrams.
Focus non-chordate specimen slides under compound microscope at 10X & 40X as the case may be and describe with suitable diagram. **Slides:** Amoeba, Paramecium (WM), Ceratium, Foraminifera shell, Volvox, Cercaria larva, Nauplius lara, Zoea larva, Alima larva of squilla, and Bipinnaria larva.

Experiment II:

Virtual laboratory: Observation and description of various systems of Frog or Rat displayed over computer.

Experiment III:

Qualitative analysis of excretory products of certain vertebrates.
Ammonia in water from aquarium - Urea in urine of a mammal - Uric acid in excreta of birds.

Experiment IV: Spotters.

Classify and giving reasons: Euglena, Sycon, Obelia colony, Ascaris, Earth worm, Leech, Sepia, Sea cucumber, Amphioxus, Shark, Teleost fish, Frog, Calotes, Pigeon and Rabbit.

Draw labelled sketches: T.S. of Ascaris (male & female), T.S. of Hydra,T.S. of Taenia solium proglottid, T.S. through an arm of Star fish and T.S. through pharynx of Amphioxus.

Relate structure and function: Gemmule, Nereis parapodium, Earthworm body setae, Trachea (WM) of Cockroach, Tube feet (WM) of star fish, Placiod Scales, Ctenoid scales, Cycloid scales, Carapace, quill feather, and hair of a mammal.

Write descriptive notes: Skeleton of frog : Skull, Vertebral column, Atlas, Typical vertebra, urostyle, pectoral girdle, pelvic girdle, fore limb skeleton and hind limb skeleton. Poisonous & non-poisonous snake (one each).

Biological significance: Paramecium conjugation, Opalina, Coral (any one), Peripatus (picture), Limulus, Balanoglossus, Ambystoma, Archeoptryx (picture) and fossil (any one).

Reference Books:

1. A Manual of Practical Zoology by Invertebrate – P.S.Verma, S.Chand & Company Limited, 5th Edition 1983, New Delhi.

2. A Manual of Practical Zoology by Vertebrate - P.S.Verma, S. Chand & Company Limited, 5th Edition 1983, New Delhi.

3. Advanced Practical Zoology – J. Sinha, A.K.Chatterjee & P. Chattopadhyay, Books and Allied (P) Ltd, 2nd Edition, 2011, Kolkatta.

UZO 13

15UZO2CL

QUESTION PATTERN

Time 3 hours Max 60 marks

Question I. Virtual Lab.

Identify and describe a system displayed over computer = 10 marks

Question II. Focus a specimen slide under Compound Microscope

at 10X/40X =05 marks

Question III. Qualitative analysis either Ammonia/Urea/Uric acid = 10 marks

Question IV. Spotters Identify and comment on as directed (5x5) = 25 marks

Question V. Record = 10 marks

----------x----------x----------

UZO 14

15UZO2IL

II - SEMESTER

Allied -A PRACTICAL –I (SERICULTURE)

Total Credits: 2

I. Moriculture:

1. Mulberry garden preparation & Maintenance
2. Preparation of Mulberry cuttings.
3. Pests & diseases of Mulberry Plant.

II. Silkworm rearing:

4. Silk worm: Life cycle.
5. Rearing house
6. Rearing equipments.
7. Pests and diseases of silkworms.

III. Eggs & Cocoons:

8. Treatment of eggs.
9. Cooking & Reeling.
10. Estimation of renditta
11. Estimation of denier.
12. Estimation of shell ratio.

IV. Field Visit/ Study Tour

UZO 15

15UZO2IL

MODEL QUESTION PAPER FOR ALLIED PRACTICAL I

CIA PRACTICAL EXAM

Model Practical Exam	=	10Marks
Observation Note	=	5Marks
Attendance	=	5Marks
Total	**=**	**20 Marks**

END OF SEMESTER EXAMINATION

Time = 3 hrs **MaxMarks = 30**

I – Determine _____ of Cocoon characters. 10 Marks

II – Determine _____ of Cocoon characters 6 Marks

III – Spotters – Identify and comment on A,B & C (3x3) 9 Marks

IV - Submission of Record 5 Marks

UZO 16

15VED201

PART IV – II SEMESTER

VALUE EDUCATION – MORAL AND ETHICS

(2012-13 onwards)

Total Credits : 2 **Total Hours : 30**

Objectives

1. To inculcate knowledge about the spiritual values among students.
2. To preserve and disseminate our moral and ethical values to the future generation.

UNIT I	The Heart of Education	**6 Hrs**
UNIT II	The Value of Body and Life – Energy The Marvelous Nature of Mind	**6 Hrs**
UNIT III	Analysis of Thoughts Benefits of Blessings	**6 Hrs**
UNIT IV	Moralisation of Desire Neutralisation of Anger	**6 Hrs**
UNIT V	**Eradication of Worry*** Harmonious Relationships	**6 Hrs**

Prescribed Text Book:

Value Education for Health, Happiness and Harmony compiled by Brain Trust, Aliyar, The World Community Service Centre, Vethathiri Publications, Erode.

*** Self Study (Questions may be asked from these topics also)**

Question Paper Pattern
(External only)

Duration: 3 hours Total Marks : 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

UZO 17

15UZO303

III - SEMESTER

CORE PAPER -3 - PHYSIOLOGY

Total Credits: 5 **Total Hours: 75**

Objectives

1. To know the functioning of the living system.
2. To understand in physical and chemical terms, the mechanisms that operate in living organisms.
3. To create awareness about the importance of nutrition and diseases.

UNIT I Nutrition and Respiration 15Hrs

Nutrition : Types of nutrition, feeding mechanisms, Digestion - extra cellular and intracellular. Metabolism of carbohydrates, fats and protein. Vitamins and minerals.

Respiration : Types of respiration, respiratory pigments, transport of gases, Bohr's effect, chloride shift.

UNIT II Circulation and Excretion 15Hrs

Circulation : Types of heart, pacemaker, neurogenic and myogenic hearts. Blood and its composition, blood clotting. Lymphatic system and its functions.

Excretion :Ammonotelism, Ureotelism and Uricotelism. Mammalian nephron, urine formation, hormonal control of renal function.Osmoregulation in freshwater, marine and terrestrial animals.

UNIT III Nerve Physiology 15Hrs

Types of nerves, myelinated and non-myelinated nerve fibres, synapse. Origin and conduction of nerve impulse; interneuronal transmission, neuromuscular junction, neurotransmitters and reflex action.

UNIT IV Muscle Physiology 15Hrs

Structure and properties of muscles, muscle proteins, isotonic, isometric contractions - chemistry of muscle contraction - Physiology of muscle contraction, theories of muscle contraction.

UNIT V Endocrinology 15Hrs

Structure and functions of endocrine glands - Pituitary, Thyroid, parathyroid, islets of Langerhans, adrenals, testis, ovary, pineal and thymus. Role of hormones in regulation of metabolism.

Text Books

1. Animal Physiology P.S.Verma, V.K.Agarwal (2009) S.Chand& Company Ltd., New Delhi.
2. A Text Book of Physiology. R.Parameswaran, S.Viswanathan(1993) (Printers & Publishers Pvt. Ltd.
3. Animal Physiology - K.A. Goyal and K.V. Sastry 2012. Rastogi Publications, Meerut, India.

Reference Books

1. Hoar, W.S., (1975) General and comparative Physiology, Prentice - Hall of India, Pvt., New Delhi.
2. Prosser CL and Brown Fo Comparative Animal Physiology Second Edition. WB Saunders Co Philadelphia, Toppa Co Tokyo Japan (1961).
3. Best CH & Taylor NB(1985) Physiology basis of medical practice. The Wilkins Company Baltimore.
4. Bentley PJ (1998) comparative vertebrate endocrinology Cambridge University Press UK (S.Chand & Co.)
5. Gorbman A and Bern HAA.(1983) Text book of comparative endocrinology wiley western Pvt. Ltd ., USA.
6. Schmit - Nelson.K.(1997) Animal Physiology Adaptation and environment Cambridge Univ. Press.
7. Christopher D. Moyer and Patricia M. Schulte (2007). Principles of Animal Physiology. 2nd Edition. Pearson. Benjamin - Cummings Publishing Company.

UZO 19

15UGA3S1

PART IV – III SEMESTER

Skill Based Subject 1 – GENERAL AWARENESS (ONLINE)

Total Credits: 3 **Total Hours : 30**

Objectives

1. To acquire knowledge in relation to various competitive examinations.
2. To create awareness about an online examination which is being followed in competitive examinations.

UNIT I **6 Hrs**

1. Tamil and other Literatures

Tamil, English, Christian and Muslim Literatures – Ancient Literature – Bakthi Literature – Epics – Medieval Literature – Modern Literature (Novel, Dramas, Short Stories, Modern Poetry).

2. Economics and Commerce

Basic Economics – Auditing – Management – Capital Market – Foreign Trade – Companies – Banking.

3. Social studies

Indian History – Inventions – Indian Poetry – Constitution - Judiciary – Languages – Literacy – Indian Geography – Lithosphere – Climate – Soil – Agriculture – Population.

UNIT II **6 Hrs**

4. Numerical Aptitude

Objective Arithmetic : Number systems – probability – **HCF and LCM of numbers*** - decimal fractions – simplification – squareroots and cuberoots – average – percentage – profit and loss – ratio and proportion – time and work – simple interest – area, **volume and surface area*.**

5. Verbal Aptitude

Spot the odd one out – correct form of verb – preposition – find out the rightly spelt word – choose the correct meaning of idioms – synonyms and antonyms.

6. Abstract Reasoning

Logic Reasoning : Logic – statement – arguments – statement assumptions – Statement course of action – theme detection – deriving conclusion from passages.

Non – verbal Reasoning : Series – analogy – classification – analytical reasoning – mirror images – water images – paper folding – paper cutting – rule detection – grouping of identical figures.

UNIT III **6 Hrs**

7. General Science and Technology

SCIENCE - Basic principles and concepts in Physics, Chemistry, Botany and Zoology.

TECHNOLOGY - Metallurgy, instrumentation, discoveries and inventions of techniques.

8. Computer Science

Historical evolution of computers – Computer applications – Data processing concepts – Computer codes and arithmetic – Hardware components – Data Structures.

9. Education

Development process of the learner – Principles of development (physical, social, emotional and intellectual) – Learning process – Teaching and teacher behaviour – Interaction analysis – Microteaching – Teacher as a leader – Motivation – Personality dimension – concept of mental health – Counselling.

UNIT IV **6 Hrs**

10. Library and Information Science

Library and Information Science – Basics, Computer, Library Network and others like Research, Reprography etc.

11. Sports and Games

Athletics – Track Events – Field Events – Games – Indoor Games – Outdoor Games – General knowledge – Sport and Olympics – First Aid.

12. Current Affairs

State, Central and International affairs: Budgets – Politics – Sports – Education – Commerce and Industry – Inventions – Science and Technology – Currency – Agriculture – Movies – Guinness records – Awards – IT Industry – Space Research – Defence etc.

UNIT V **6 Hrs**

13. National Cadet Corps (NCC)

Introduction to the Armed Forces (Army, Navy, Air Force) – Dril – Weapon Training – Map Reading – Civil Defence.

14. National Service Scheme (NSS)

History of NSS – History of Motto, Symbol, Badge – Aims and Objectives – Duties and Total Hours – Organisational and Administrational setup – History of voluntary organization – Regular activities – Special camp activities – Special programmes – awards – Important days.

15. Youth Red Cross (YRC)

History of International Red Cross – History of Indian Red Cross – History of Youth Red Cross – Main objectives of YRC – Emblem – Fundamental principles of Red Cross – Organizational Setup – Activities of Youth Red Cross – Role of different functionaries – Training programmes for YRC Program Officers – Training programme for YRC Volunteers – YRC Song – Working Hours – General orientation – Special orientation – Program skill learning.

*** Self Study (Questions may be asked from these topics also)**

UZO 21

Text Book

1. VBC 1 – General Awareness, Question Bank, Kongunadu Arts and Science College, Coimbatore – 29, 2006.

Question Paper Pattern

Max. Marks 100

End of Semester Examination (ESE)- On-Line Examination **75 Marks**

1. 150 questions are to be given. Each question carries ½ mark.
2. In each unit, 30 questions are to be given, covering all the 5 units.

Continuous Internal Assessment (CIA) (through On-Line) **25 Marks**

a) Two Exams.	15 Marks
b) Assignment**	5 Marks
c) Attendance	5 Marks

** Each student has to submit an assignment in the topic Current Affairs area.

UZO 22

15UHR3N1

Part IV – III Semester

Non- Major Elective - I "Human Rights"

Total Credits: 2 **Total Hours :30**

Objectives

1. To impart knowledge of human values, ethics and human rights to the students.
2. To reinforce positive personality traits and enhance physical, mental, social ethical and spiritual well-being of the students.

UNIT I Concept of Human Values, Value Education towards Personal Development 6 Hrs

Aim of education and value education; Evolution of value-oriented education; Concept of human values; types of values; Components of value education.

Personal Development:

Self-analysis and introspection; sensitization towards gender equality, physically-challenged, intellectually-challenged. Respect to - age, experience, maturity, family members, neighbours, co-workers.

Character Formation towards Positive Personality:

Truthfulness, Constructivity, Sacrifice, Sincerity, Self-Control, Altruism, Tolerance, Scientific vision**.**

UNIT II Value Education towards National and Global Development National and International Values 6 Hrs

Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity.

Social Values - Pity and probity, self-control, universal brotherhood.

Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith.

Religious Values - Tolerance, wisdom, character*.

Aesthetic Values - Love and appreciation of literature and fine arts and respect for the same.

National Integration and international understanding.

UNIT III Impact of Global Development on Ethics and Values 6 Hrs

Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges and compromise.

Modern challenges of adolescent emotions and behaviour; sex and spirituality: comparison and competition; positive and negative thoughts.

Adolescent emotions, arrogance, anger, sexual instability, selfishness, defiance.

UZO 23

UNIT IV Therapeutic Measures 6 Hrs

Control of the mind through

a. Simplified physical exercise
b. Meditation – objectives, types, effect on body, mind and soul
c. Yoga – objectives, types, Asanas
d. Activities:*
   (i) Moralisation of Desires
   (ii) Neutralisation of Anger
   (iii) Eradication of Worries
   (iv) Benefits of Blessings

UNIT V Human Rights 6 Hrs

1. Concept of Human Rights – Indian and International Perspectives
   a. Evolution of Human Rights
   b. Definitions under Indian and International documents
2. Broad classification of Human Rights and Relevant Constitutional Provisions.
   a. Right to Life, Liberty and Dignity
   b. Right to Equality
   c. Right against Exploitation
   d. Cultural and Educational Rights
   e. Economic Rights
   f. Political Rights
   g. Social Rights
   h. Rights to Information
3. Human Rights of Women and Children
   a. Social Practice and Constitutional Safeguards
      (i) Female Foeticide and Infanticide
      (ii) Physical assault and harassment
      (iii) Domestic violence
      (iv) Conditions of working women
4. Institutions for Implementation
   a. Human Rights Commission
   b. Judiciary
5. Violations and Redressal
   a. Violation by State
   b. Violation by Individuals
   c. Nuclear weapons and terrorism
   d. Safeguards

* **Self-study(Questions may be asked from these topics also)**

Prescribed Book : Human Rights, Compiled by Bharathiar University, Coimbatore - 46

15UZO404

IV - SEMESTER

CORE PAPER – 4 - CELL BIOLOGY

Total Credits: 5 **Total Hours: 75**

Objectives

1. Cell biology helps to study cytological characteristics.
2. Cell biology provides to produce vaccines, monoclonical antibodies.
3. Cell biology is the platform for the emergency of different fields like genetic engineering, cell culture, biotechnology and molecular biology.

UNIT-I **15Hrs**

Microscopy: Compound and Electron Microscopes, Microtome-Stains-Nuclear and cytoplasmic stains and staining techniques. Introduction to cell and cell types. Structure of Prokaryotes and Eukaryotes.

UNIT – II **15Hrs**

Structure and function of plasma membrane, Lysosomes, Golgi bodies and Ribosomes.

UNIT – III **15Hrs**

Structure, function and origin of Endoplasmic recticulum, Mitochondria and Nucleus.

UNIT-IV **15Hrs**

Chromosome types, organization, polytene and lampbrush chromosomes, Structure and functions of centrosomes. Mitosis and meiosis, significance of crossing over spindle fibres - structure and functions.

UNIT – V **15Hrs**

Nucleic acids - Structure of DNA and RNA
DNA replication - protein synthesis - Cell aging and study of cancer cells.

Text Books

1. Text book of cytology- P.S.Verma and V.K.Agarval, (1999) S.Chand& Company (Pvt.) Ltd, New Delhi.
2. Cell Biology - N.Arumugam 6th revised edition(2007) - Saras Publications, Gomee, Shanmugapuram, Kanyakumari.

Reference Books

1. Cell & Molecular Biology S.C.Rastogi, (2010) 3rd Edition, New Age International (P) Limited, Publishiers, New Delhi.
2. Cell Biology, E.J.Ambrose, Dorothy.M.Easty(1970) Second Edition, The English language book society & Nelson, Great Britain at the camelot Press Ltd, Southampton.
3. Introduction to Cell Biology, Stephen L.Wolfe (1999) Wadsworth Publishing Company, Belmont, California, A Division of Wadsworth, Inc.
4. Cell Biology, C.B.Power(2009) Himalaya Publishing House, Mumbai.
5. Animal cytology & Evolution, M.J.D. White Third Edition, (1973) Vikas Publishing House Pvt Ltd. New Delhi.
6. Cell biology – Dr. S. P. Singh and Dr. B. S. Tomas. 11th edition (2012), Rastogi Publications, Meerut - 02, India.

15UZO4CM

IV - SEMESTER

CORE PRACTICAL II - PHYSIOLOGY AND CELL BIOLOGY

Total credits: 2

Physiology:

1. Estimation of O2 consumption in an aquatic animal (fish).
2. Total RBC count in human blood.
3. Total WBC count in human blood.
4. Salivary amylase activity with human saliva.
5. Preparation of haemin crystal in human blood.
6. Estimation of haemoglobin in human blood.
7. Blood grouping A,B,AB & O with Rh factor.
8. Preparation of blood smear (human) and observation types of leucocytes.

Cell Biology:

1. Squash preparation of onion root tip to observe mitotic stages.
2. Preparation of Buccal smear (human) to observe Barr body.

Spotters:

1. Stages of mitosis.
2. Stages of meiosis.
3. Haemocytometer.
4. Haemoglobinometer.
5. Anti-A & B serum.
6. DNA model.
7. Sphygmomanometer.
8. Glucometer.
9. Columnar epithelium
10. Ciliated epithelium.
11. Cardiac muscle TS.
12. Bone tissue TS.
13. Simple squamous epithelium.
14. Nervous tissue.

15. Frog – Blood smear .

UZO 27

15UZO4CM

MODEL QUESTION PAPER FOR CORE PRACTICAL II

Time 3 hours Max 60 marks

Question I. Major Experiment = 20 marks

Question II. Minor Experiment = 10 marks

Question III. Spotters (4x5) = 20 marks

Question IV. Record = 10 marks

----------x----------x----------

15UZO4S2

IV - SEMESTER

SKILL BASED SUBJECT 2 - HEALTH EDUCATION

Total Credit: 3 **Total Hours: 30**

Objectives

1. Health education helps people to follow and maintain healthy practices and life styles
2. Health education provides information about the environmental changes which are necessary for healthy life.
3. Health education discusses about the various methods to conduct professional training to improve the health status of the people

UNIT I **6Hrs**

Concept of health
Determinants of health- Indicators of Health- Personal hygiene- Public health- **Concepts of disease-**Agent- Host and Environment **Dynamics of disease transmission**
Sources and routes of transmission.

UNIT II **6Hrs**

Nutrition and health
Proteins, Carbohydrates, Fat, Trace elements- Food hygiene- Energy requirements- balanced diet- Malnutrition.

UNIT III **6Hrs**

Environment and health
Water pollution and health effects- Air pollution and health effects- Solid pollution and health effects.

UNIT IV **6Hrs**

Communicable disease
Viral and bacterial disease (AIDS, STD, Mumps, Tuberculosis, Typhoid)
Non communicable diseases
Diabetes, Cancer, Heart attack, Kidney problems.
Vector- borne diseases
Malaria.

UNIT V **6Hrs**

Health care of the community

Concept of prevention- Health care services- Health programmes in India.

UZO 29

Text Books

1. Health and Healthy Body- Vedanta Kerari. Ramakrishna math, Chennai
2. Total Health- Paramjit Rana 2002 English Edition, Mumbai

Reference Books

1. Health-Ruth Ann Aalthaus 1987, Scottforesman-xx.
2. Hand book of Pollution, control processes. Robert noyesjaico publishing house, Mumbai. (2001).
3. You and your health, Harnold Shyrlock, Hubert. O. Swartout Pacafic press publishing association- London, (1998).
4. Health. Bud Getchell, Rurtypipin. Jill Varnes, Stephen. D.C. Health and Company, Massachusetts, (2000).

15UWR4N2

Part IV – IV SEMESTER

Non- Major Elective - II "Women's Rights"

Total credits: 2 **Total Hours: 30**

Objectives

1. To impart specific and up-to-date information about national and international laws related to the welfare of women.
2. To create awareness about crimes against women, legal rights of women in the country and access to justice.

UNIT I LAWS, LEGAL SYSTEMS AND CHANGE 6 Hrs

Definition - Constitutional law, CEDAW and International Human Rights – Laws and Norms – Laws and Social Context – Constitutional and Legal Framework.

UNIT II POLITICS OF LAND AND GENDER IN INDIA 6 Hrs

Introduction – Faces of Poverty – Land as Productive Resources – Locating Identities – Women's Claims to Land – Right to Property - Case Studies.

UNIT III WOMEN'S RIGHTS: ACCESS TO JUSTICE 6 Hrs

Introduction – Criminal Law – Crime Against Women – Domestic Violence – **Dowry Related Harassment* and Dowry Deaths*** – Molestation – Sexual Abuse and Rape – Loopholes in Practice – Law Enforcement Agency.

UNIT IV WOMEN'S RIGHTS 6 Hrs

Violence Against Women – Domestic Violence - The Protection of Women from Domestic Violence Act, 2005 - The Marriage Validation Act, 1982 - The Hindu Widow Re-marriage Act, 1856 - The Dowry Prohibition Act, 1961

UNIT V SPECIAL WOMEN WELFARE LAWS 6 Hrs

Sexual Harassment at Work Places – Rape and Indecent Representation – The Indecent Representation (Prohibition) Act, 1986 - Immoral Trafficking – The Immoral Traffic (Prevention) Act, 1956 - Acts Enacted for Women Development and Empowerment - Role of Rape Crisis Centers.

* **Self-study (Questions may be asked from these topics also)**

Prescribed Book :

Women's Rights Compiled by Kongunadu Arts and Science College, Coimbatore-29.

References

1. NityaRao "Good Women do not Inherit Land" Social Science Press and Orient Blackswan 2008
2. International Solidarity Network "Knowing Our Rights" An imprint of Kali for Women 2006
3. P.D. Kaushik "Women Rights" Bookwell Publication 2007
4. Aruna Goal "Violence Protective Measures for Women Development and Empowerment" Deep and Deep Publications Pvt. 2004
5. Monica Chawla "Gender Justice" Deep and Deep Publications Pvt. Ltd.2006
6. Preeti Mishra "Domestic Violence Against Women" Deep and Deep Publications Pvt. 2007
7. Clair M. Renzetti, Jeffrey L. Edleson, Raquel Kennedy Bergen, Source Book on "Violence Against Women" Sage Publications 2001.

NON-MAJOR ELECTIVES I & II
(2012 - 2013 onwards)

QUESTION PAPER PATTERN

Duration: 3 Hours **Max. Marks: 75**

Answer ALL Questions

SECTION A (5 x 5 = 25 marks)

Short answers, either or type, one question from each unit.

SECTION B (5 x 10 = 50 marks)

Essay type questions, either or type, one question from each unit.

15UZO505

V - SEMESTER

CORE PAPER - 5 - GENETICS

Total Credits: 4 **Total Hours: 75**

Objectives

1. To make the students develop a comprehensive knowledge of pioneers and their contributions to genetics
2. To make the students understand various principles of heredity.
3. To make the students know about the application of genetic principles in different populations.

UNIT-I **15Hrs**

Mendelian principles: Mendel's monohybrid and dihybrid experiments and inferences. Interactions of genes: Incomplete dominance, co-dominance, complementarygenes, supplementary genes and duplicate genes. Multiple alleles with examples: Drosophila, coat colour in rabbit. Human blood group inheritance: ABO, Rh factor.

UNIT-II **15Hrs**

Linkage in Drosophila. Crossing over: kinds of crossing over, crossing over in Drosophila, Cytological basis of crossing over - Stern's Experiment. Sex determination in Man, Drosophila, Birds and Honeybees. Sex- linked inheritance in Drosophila.

UNIT-III **15Hrs**

Fine structure of gene (cistron, muton and recon). Gene mutation and chromosomal aberration.Detection of mutation by CLB Method.Mutagens:Physical and chemical.

UNIT-IV **15Hrs**

Genetic code. Sex linkage in Man; Colour blindness, Haemophilia.Gene - protein relationship with reference to sickle cell anemia. Genetic disorders in Man: Klinefelter's syndrome and Turner's syndrome. Biochemical Genetics: phenylketonuria, albinism, alkaptonuria

UNIT-V **15Hrs**

Inbreeding, outbreeding and hybrid vigour. Population genetics: Hardy - Weinberg law. Eugenics and Genetic counseling. Human Genome Project.

Text Books

1. A text book of Genetics – Veer Bala Rastogi(2010) 3rdEdnKadarnathRamnath, New Delhi.
2. Genetics - Verma, P.S & Agarwal V.K. (2007) S.Chand& Company Pvt. Ltd, New Delhi.

Reference book

1. Principles of Genetics - Gardner E.J. (1991) Wiley Eastern Pvt. Ltd., New Delhi.
2. Principle of Genetics – Sinnot, E.W. Dunn. L.C. Dobzhausky (2004) McGraw Hill Book Company, New York
3. Genetics- Winchester A.M.(1967) Oxfrord IBH, Madras
4. Elementary Genetics - Singleton, W.R.(1963) Van Nostrand Company, New York
5. Principles of Genetics - Robert - H - Lewin, (2002) Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.
6. Principles of Genetics (6th Edition). (2011). D. Peter Snustad and Michael J. Simmons. Wiley Publishers.

15UZO506

V - SEMESTER

CORE PAPER – 6 – BIOTECHNOLOGY – I

Total Credits: 4 **Total Hours: 75**

Objectives

1. Biotechnology helps to protect agriculture.
2. Biotechnology provides to invent new drugs for various diseases.
3. Biotechnology discusses to improve the industrial sector.

UNIT I Biotechnology - Scope and importance 15Hrs

Major areas of Biotechnology and the products related to medicine, agriculture and environment, Biotechnology centres in India and the scope for future development, **IPR** and patenting.

UNIT II Tools of genetic Engineering 15Hrs

Agarose gel electrophoresis for protein and DNA isolation, Blotting Techniques, Polymerase Chain Reaction (PCR), Gene synthesis by using mRNA.

UNIT III Basics of Genetic Engineering 15Hrs

Restriction enzymes and their importance.Vectors of bacterial, viral and fungal sources. (Plasmids ; phage vector - insertion vector and yeast artificial chromosome). Gene cloning in Bacteria and Eukaryotic organisms. - Screening of recombinants.

UNIT IV Animal Cell, Tissue and Organ Culture 15Hrs

Requirements for animal cell and tissue culture. Methods of primary cell culture and evolution of cell line. Products obtained through cell culture. Methods of cryopreservation.

UNIT V Culture techniques of plant cells 15Hrs

Requirements for invitro cultures. Methods of plant cell / tissue culture: Inoculation - Explant culture - Callus formation and micropropagation. Transgenic plants. Protoplast culture : Protoplast fusion and somatic hydridization.

Text Books

1. A Text Book of Biotechnology - R.C.Dubey, (2012) 4th Edition S.Chand & Co.Publications New Delhi.
2. Biotechnology - V.Kumaresan (2009) - Saras Publications, Kanyakumari.

Reference Books

1. Advances in Bio technology - S.N. Jogdand. Fifth revised edition 2005. Published by Himalaya publishing house.
2. Gene cloning and DNA analysis - T.A.Brown, fourth edition, Blackwell Publishing 2001.
3. Biotechnology - Mohan. P. Arora. First Edition 2003, Published by Himalaya Publishing House. Edited by Chander Kanta.
4. Animal Cell Biotechnology, Volume-2, Edited by R.E.Spier & J.B.Griffiths (1985) Academic press London Limited.
5. Animal Cell Biotechnology, Volume-1, Edited by R.E.Spier & J.B.Griffiths (1985) Academic press London Limited.

16UZO507

V - SEMESTER

CORE PAPER - 7 – ECOLOGY

Total Credits: 4 **Total Hours: 75**

Objectives

1. To know the fundamental principles that govern the functioning of the environment.
2. To understand the concept of ecosystem and balance of nature.
3. To assess the relationship between environment and organisms.

UNIT – I **15Hrs**

Introduction to environment: Abiotic factors of the environment - Temperature, Light, Oxygen, Carbondioxide and biological rhythm.
Biotic factors of the environment: Commensalism and mutualism.

UNIT-II **15Hrs**

Ecosystem: Compenents of Ecosysten, pond as an example of Ecosystem - Food chain- Food web-Ecological pyramid and energy flow.

UNIT-III **15Hrs**

Biogeochemical cycle - Water cycle- nitrogen and phosphorus cycles.

Population ecology: Density- Natality- Mortality- Age distribution-Population growth and Dispersal.

UNIT-IV **15Hrs**

Community ecology: characters- Structure- Dominance- Stratification- Periodicity- Ecotone-Edge effect-Ecological niches and Ecological succession.

UNIT-V **15Hrs**

Habitat ecology: Zonation-Characters-Flora and Fauna and their adaptation of aquatic habitats - fresh water, estuary and marine.

Terrestrial habitat: Physico-chemical characteristics - Forests, tundra, grasslands and deserts.

Text books

1. Animal ecology and Distribution of Animals. M. S. Jeyaraj and Veerbala Rastogi (2013), KedarnathRamnath publishers, Meerut, Delhi.
2. Concepts of Ecology by N. Arumugam (2010), Saras publications, TamilNadu.

Reference books

1. Environmental Biology - P. S. Verma and V. K. Agarwal (1999) S.Chand& co, New Delhi
2. Ecology and Environment - P. D. Sharma (2000) RostogiPublications,Meerut, India.
3. Environmental Biology - Agarval, K. C. (1987) Agro Botanical Publisher,India.
4. Ecology and Ethology - V. K. Agarwal and Usha Gupta, S.chand& Company (2002) Ramnagar New Delhi.
5. Odum, E.P.1969. Fundamentals of Ecology. W.B. Saunders publications, London.

16UZO508

V - SEMESTER

CORE PAPER-8- BIOSTATISTICS, BIOPHYSICS AND BIOINFORMATICS

Total Credits: 4 **Total Hours: 75**

Objectives

1. To create awareness in the collection analysis of data and interpretation of results.
2. Statistics has proved to be useful in study of all natural sciences and also applied in research work.
3. Computer application gives basic knowledge to the students and provides all kinds of information within short period through internet.

UNIT I **15Hrs**

Data Collection- Sources of Primary and Secondary data collection, Classification and Tabulations, Diagrammatic representation of data- Bar diagram, Pie diagram, Graphical presentation of data - Histogram, Frequency polygon, Frequency curve, Ogive, Pictograph.

UNIT II **15Hrs**

Measures of Central Tendency - Calculation of arithmetic mean, median and mode. Merits and demerits. Measures of dispersion - Standard deviation and standard error. Student's t-test.

UNIT III

Biophysics: Principles and Applications: P^H meter, Spectrophotometry, Electrical Conductivity, Paper Chromatography and Electrophoresis.

UNIT IV **15Hrs**

Computer operating systems: Windows - Introduction to MS Word, Excel, PowerPoint, Internet, World Wide Web (WWW), Search engines, E-mail and Computer virus.

UNIT V **15Hrs**

Bioinformatics: History, Definition and Scope, Data bases: Protein and DNA, FASTA tools and BLAST, GENBANK and EMBL.

Text books

Biostatistics

1. Palanisamy, S. and Manoharan, M. 1992. Biostatistics for biologist, Paramount Publications, Palani.
2. Ramakrishnan, P. 2009. Biostatistics, Saras publications, Nagercoil- 629002.
3. S.P. Gupta, 2006. Statistical methods. Sultan Chand and sons- 23, Daryagans, New Delhi- 110002.

Computer Applications

1. Pradeep, K. Sinha and Pritisinha. 1995. Computer Fundamentals, Concepts Systems and Applications. BPB Publications- New Delhi.

BIOINFORMATICS book

BIOINSTRUMENTATION book

Reference Books

Biostatistics

1. Gupta, S.P. 2006. Statistical methods, Sultan Chand and sons, Educational publishers, New Delhi.
2. Pillai, R.S.N. and Bhagavathi, V. 2001. Statistics, S.Chand and Co., New Delhi-5.
3. Prasad.S.2004. Elements of Biostatistics Rastogi Publications, Meeruit, India.

Computer Applications

1. Fundamentals of computers 4th edition V.Rajaram (2006). Prenlice Hall of India, Private Ltd- New Delhi- 110001.
2. Parameshwaran, R. 1997. Computer applications in Business. S. Chand and Co., New Delhi.

16UBC/UBT/UBO – 5X1

V - SEMESTER

Ornamental Fishery Technology

(EDC)

Aim:

The course is intended to impart thorough knowledge on all aspects related to ornamental fishes to students for skill development to independently operate a ornamental fish breeding unit. Therefore, visit to ornamental fish farms should be carried out along with the theory classes to get hands on experience.

Objectives:

1. To give overview on the potential ornamental fishes and their breeding habits
2. To develop idea about the various management practices for breeding and rearing of ornamental fishes
3. To have a basic understanding of aquarium setting and aquarium accessories involved.

Unit 1: Introduction

Introduction to aquaculture, ornamental fishes and aquarium accessories. World aquarium trade and present status. Opportunities and its challenges

Unit 2: Aquarium and accessories

Setting up of aquarium – Tank shape and size, Tank fabrication, Type of filters, Aerators and other accessories

Unit 3: Freshwater Ornamental Fishes

Aquaponics, Brood stock management and seed productions, Commercial production of goldfish, live bearers, gouramies, barbs and tetras, angel, and Molly fishes. Large scale production of fishes and aquatic plants.

Unit 4: Marine Ornamental Fishes

Diversity of marine ornamental fishes. Method of collection and transportation of live fish. Use of anesthetics. Quarantine measures. Breeding of marine ornamental fishes. Reef aquarium and live rocks. Culture and packing.

Unit 5: Aquarium Management

Sanitation and disinfection , Water quality management, Feed Management and Fish Health Management.

Text Books

1. Marine Aquarium keeping: The Sciences, Animals and Art. John Wiley & Sons, New York
2. Ramachandran.A, Breeding, Farming and Management of Fishes, CUSAT
3. Madhusoodanakurup etal – Ornamental Fish – Breeding, Farming and Trade CUSAT.
4. Jhingran,V.G. Fish and Fisheries of India.
5. Bijukumar,A. Rearing of Aquarium Fishes.
6. Rath,A.K. Freshwater Aquaculture,
7. Santhanam, et.al. a Manual of Freshwater Aquaculture

Reference Books

1. Biswas. S.P., J.N.Das, U.K.Sarkar and Lakra W.S. 2007 Ornamental fishes of North East India : An Atlas : NBFGR
2. Murthi.V.S. 2002 Marine ornamental Fishes of Lakshadweep CMFRI, Special publication 72
3. Butting.B., Holthus, P.S. Dalding,S. 2003, Marine Aquarium Industry and conservation.
4. Oliver, K 2003. World trade in ornamental species
5. Marine Ornamental species; collection and Conservation
6. Fish Disease and Disorders, CAB international, Oxford.

15UZO609

VI - SEMESTER

CORE PAPER - 9 MICROBIOLOGY AND IMMUNOLOGY

Total Credits: 4 **Total Hours: 60**

Objectives

1. To aware basic knowledge on microorganisms like bacteria and virus
2. To know about economic importance in relation to Agriculture, industry and medicine.
3. To inculcate the fundamental knowledge on immunology studies focused on immune system, antigen antibody reactions and vaccinations.

UNIT I **12Hrs**

General bacteriology - Bacterial morphology, Structure, Identification and staining - Culture methods - Bacterial taxonomy.

UNIT II **12Hrs**

Morphology and chemical properties and classification of virus-ultra structure of a bacterio phage - Lytic and lysogenic cycle of bacteriophage - (In Medicine, Industry, Agriculture), Microbiology of water, soil and air, Quantification of microbes.

UNIT III **12Hrs**

Microbial Disease of Man

Causative organisms: Basic structure, Toxicity, symptoms and preventive measures; Protozoan diseases, Typhoid, Diphtheria, Whooping cough, Pneumonia, Poliomyelitis, AIDS.

UNIT IV **12Hrs**

Cells and Organs of Immune System cells of the Immune system

Cells of lymphoid and myeloid lineage. Primary lymphoid organs (thymus, bone marrow) Secondary lymphoid organs (lymph node, spleen, mucosal associated lymphoid tissue)

Types of immunity: Innate immunity and acquired immunity.

UNIT V **12Hrs**

Antigen and antibody, structure, functions and interactions. Immune Response: Primary and secondary, cell mediated and humoral immunity, Vaccination preparation types. Complements-types, Salient features and functions.

Text Books

1. Microbiology-Michael. J.Pelczar, (1993) MC Grand Hillpublications,Chennai.
2. Immunology-Dulsy Fatima &Arumugam.N(2000) Saras Publication, Nagercoil.

Reference Books

1. Microbiology-C.B.Power and Daginawala.H.F (1984) Himalaya Publishing houses Bombay.
2. General Microbiology-Roger. Y.Stanier (1992) Macmillan Publications, London.
3. Industrial Microbiology - Casida. L.E (2007) Newage International (P) limited, New Delhi.
4. The short text books of Medical Microbiology - SatishGupte, Jaypeebrothers (2006) Medical Publishers (P) Ltd - Culcutta.
5. Immunology – Duby.J (1999) - W.G.Freeman & Co, New York

15UZO610

VI - SEMESTER

CORE PAPER - 10 - BIOTECHNOLOGY-II

Total Credits: 4 **Total Hours: 75**

Objectives

1. Biotechnology helps to learn application oriented aspects.
2. Biotechnology provides to learn advanced topics.
3. Biotechnology helps to understand Global scenario.

UNIT I Industrial and microbial biotechnology 15Hrs

Basic design of a fermentor - micro-organisms and their products - stages of down steam processing.

Microbial products - microorganisms used in ethanol production. Antibiotics - antibiotics produced by micro-organisms (eg. Penicillin)

UNIT II Agricultural biotechnology 15Hrs

Production of algal biomass - mass cultivation of spirulina, (SCP).Production of yeast biomass.Mushroom cultivation - Cultivation methods (any one type) -Biological Nitrogen Fixation - mechanism of N_2 fixation and ammonia assimilation in non symbiotic and symbiotic microbes.

UNIT III Biofertilizers 15Hrs

Biofertilizers - Nitrogen biofertilizers - Phosphate biofertilizers - Method of production of VAM inoculum for application.

Biopesticides - Biological control of plant pathogens. Types of antagonists used as biopesticides. Examples of predation and parasitism.

UNIT IV Biotechnology in Human and Animal Health Care 15Hrs

Industrial production of 1.Insulin, 2.Somatotropin, 3. Human interferon (any one example) Production of different kinds of vaccine, (any one example)

UNIT V Environmental Biotechnology 15Hrs

Biogas technology in India. Biogas production, Hydrogen as a biofuel - Types of bioremediation - sewage treatment processes - Bioconversion of solid by biological organisms (any one example).

Text books

1. Biotechnology - V.Kumaresan (2009) - Saras Publications, Kanyakumari.
2. A text books of Biotechnology - R.C.Dubey (2012) S.Chand and Company, New Delhi.

Reference Books

1. Recombinant DNA - A short course James D Watson, John Tooke and Tkurtl (1983) Scientific American Books.
2. Biochemical methods - S.Sadasivam (2004). New Age International Publications.
3. Advances in Bio technology - S.N.Jogdand. fifth revised edition (2005). Published by Himalaya publishing house.
4. Gene cloning and DNA analysis - T.A.Brown, fourth edition (2001), Blackwell Publishing.
5. Biotechnology - Mohan.P.Arora. First Edition (2003), Published by Himalaya Publishing House. Edited by ChanderKanta.

15UZO611

VI - SEMESTER

CORE PAPER - 11 - DEVELOPMENTAL BIOLOGY

Total Credits: 4 **Total Hours: 75**

Objective

1. Development of an organism from the egg to an adult.
2. Comparative embryology deals with evolution and polygenetic significances.
3. Recent technology in embryo development and embryo transfer.

UNIT-I Theories of Development **15Hrs**

Theories of Preformation, Epigenesis, Pangenesis, Bear's law, Biogenetic law, Germplasm theory, Mosaic theory, Regulative theory, Gradient theory and Theory of Organizer

Gametogenesis
Spermatogenesis, Oogenesis, Types of egg, polarity - Symmetry

UNIT II Fertilization **15Hrs**

Sexual cycles-Hormonal control, physico-chemical aspects of fertilization.

Theories of fertilization, In Vitro fertilization (IVF)

UNIT III Cleavage **15Hrs**

Planes of cleavage - Patterns of cleavage - Laws of cleavage.
Patterns of cleavage as illustrated in Amphioxus, Frog, chick and pig.
Blastulation,
Types of blastula, Fate maps

UNIT IV Gastrulation **15Hrs**

Morphogenetic movements - Gastrulation in Frog and Chick.
Organogenesis in frog
Development of Brain, Eye, Ear, Heart

UNIT V **15Hrs**

Embryonic Nutrition
Extra embryonic membranes in chick and Pig.
Placentation in mammals.
Experimental Embryology
Gradients Spemann s experiments on organizer.

Text Books

1. A text book of Embryology Dr. N. Arumugam (2010) Saras Publications, New Delhi.
2. Chordate Embryology. P.S. Verma, (2012).V.K. Agarwal, S. Chand Company Ltd., New Delhi.

Reference Book

1. Developmental Biology. Scott. F. Gilbert (2010) Sinauee Associates Inc.
2. An Introduction to Embryology - Balanisky (2008), B.I. Saunder's Company, Pub. Philadelphia.
3. Developmental Biology - Beril, D.B (2002) Naeosa publishing house Pvt Ltd New Delhi.
4. Foundation of Embryology- B.M. and Carlson, B.M (2007) Tata McGraw Hill. New Delhi.
5. CHR. P. Raven (1959) Pergamon Press. New York.

16UZO612

VI - SEMESTER

CORE PAPER - 12 – ANIMAL DIVERSITY

Total Credits: 5 **Total Hours: 60**

Objectives

1. To understand the present status of Fauna.
2. It creates an awareness of conservation of Endangered Fauna.
3. It helps to understand the comparison of ancient and recent information about the biodiversity.

UNIT I **12Hrs**

Biodiversity – Concept and Definition, Latitude and longitude diversity, Types of biodiversity – Problems inventorying species – Biodiversity Hot spots – Western Ghats. IUCN Threatened categories – Selected endangered animals of India.

UNIT II **12Hrs**

Peoples participation in Biodiversity conservation – Causes of decline of biodiversity – Sustainable Development – Biogeography

UNIT III **12Hrs**

Processes responsible for species richness and extinction – Metapopulation concept – Current and future species extinction rates , Biodiversity Measurement.

UNIT IV **12Hrs**

Ecosystem Diversity: Wetland ecosystem – Marine ecosystem – Estuarian ecosystem – Mangrove ecosystem, Biodiversity Act.

UNIT V **12Hrs**

Conservation of Biodiversity : Invitro conservation – DNA barcoding – Test tube gene bank – Field gene bank – Sacred groves, Stalavrikshas – Future strategy for the conservation of Biodiversity, Animal Ethics.

Text books

1. An advanced text book of biodiversity, Principles and practice. Dr. K. Krishnamoorthy, Oxford and IBH publication company Pvt. Ltd, New Delhi. 2003.
2. Organic evolution. Mohan P. Arora, Himalaya publishing house, Mumbai, 2002.
3. Biodiversity principles and conservation. U. Kumar and Mahendrajeet Asija, Student edition, Jodhpur. Ed.2. 2005.

References

1. Genes and evolution. A.P. Jha, Macmillan publishers India Ltd. New Delhi, Ed.1. 1993.
2. Biodiversity. Ramamurthy Rallapalli and Geetha Bali, APH Publishing Corporation, New Delhi, 2002.
2. Evolution and the Diversity of Life. Ernst Mayr, The Belknap Press Hardvard Univ. Press. London, Ed.4. 1997.
3. Evolution, Monroe W Strickberger, Jones and Bartlett publication, New Delhi, Ed.3. 2000.
4. Glimpses of Biodiversity. B. B. Hosetti, Daya Publishing House, New Delhi, 2002.
5. Biodiversity in India. T .Pullaiah, Regency publication, New Delhi, Vol 4, 2006.
6. Organic evolution. Veer Bala Rastogi, Kedarnath Ramnath Publishers, Uttar Pradesh, 2007.

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VI - SEMESTER

CORE PRACTICAL - III - {cp.3,5,7,8,11,13,14}

Total Credit: 2

ECOLOGY

I. Analysis of water – Pond and Sewage.

1. Estimation of dissolved oxygen
2. Salinity
3. pH
4. Carbonates and bicarbonates
5. Carbondioxide

II. Qualitative analysis of plankton (any five) & mounting.

III. Study of intertidal rocky, sandy and muddy shore fauna (any three examples) with their specific adaptations.

DEVELOPMENTAL BIOLOGY

Frog embryology slides: Stages of cleavage – 2 cell stage, 4 cell stage, 8 cell stage, Blastula and Gastrula.

1. Chick embryology - Stages of development 24hr, 48hr, 72hr & 96hr.
2. Placenta of Pig, Sheep and Man.

FIELD STUDY

1. Visit to coastal area to study the intertidal fauna

SERICULTURE

1. Study of life history of *Bombyxmori* using live specimens.
2. Practical knowledge of methods of Silkworm rearing. Visit to Silkworm rearing center.
3. Assessment of cocoon characters- Shell ratio, Denier and Renditta.

VERMICULTURE

1. Rearing of earthworm.
2. Preparation of Vermibed.

PESTS AND THEIR CONTROL

Spotters: Identify and comment on

1. Coconut pest
2. Brinjal pest
3. Mosquitoes (Adults of Culex and Aedes)
4. House fly

5. Bed bug
6. Head louse

UZO 52

MODEL QUESTION PAPER FOR CORE PRACTICAL III

CIA PRACTICAL EXAM

Model Practical Exam	=	25 Marks
Observation Note	=	10 Marks
Attendance	=	5 Marks
Total	**=**	**40 Marks**

END OF SEMESTER EXAMINATION

Time- 3 Hours **Max Marks-60**

Q I : Major Experiment	-	20 Marks
Q II : Minor Experiment	-	15 Marks
Q III :Spotters 3x5	-	15 Marks
Q IV : Record	-	10 Marks
Total	**-**	**60 Marks**

UZO 53

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VI - SEMESTER

CORE PRACTICAL-IV-{cp.6,9,10}

Total Credit: 2

1. Sterilization Techniques.
2. Media preparation.
3. Distribution of microbes in air and water media.
4. Isolation of DNA from a tissue sample.
5. Isolation of protein by precipitation method.
6. Determination of protein content.
7. Isolation and determination of Carbohydrate from a sample.
8. Determination of Microbiological quality of milk by MBR Test.
9. Hanging drop culture of cells from an animal source.
10. MPN test.
11. Gel electrophoresis (Demonstration only).
12. Determination of phosphatase activity.
13. Spoilage of food products theory.
14. Visit to industries related to Biotechnology.

UZO 54

Spotters

1. Electrophoretic instruments.
2. Vaccine (Viral vaccine)
3. Antibiotic (Penicillin)
4. Laminar air flow chamber
5. Plant saplings produced through plant tissue culture
6. Spirulina (SCP) Biopesticides (Neem, Pongamia)
7. Biofertilizer (Azolla)
8. Mushrooms
9. Nitrogen fixing plant
10. Vermicompost
11. Autoclave
12. Cell culture media
13. Insulin (commercial)

UZO 54

Spotters

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2. Vaccine (Viral vaccine)
3. Antibiotic (Penicillin)
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8. Mushrooms
9. Nitrogen fixing plant
10. Vermicompost
11. Autoclave
12. Cell culture media
13. Insulin (commercial)

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MODEL QUESTION PAPER FOR CORE PRACTICAL IV

CIA PRACTICAL EXAM

Model Practical Exam	=	25 Marks
Observation Note	=	10 Marks
Attendance	=	5 Marks
Total	**=**	**40Marks**

END OF SEMESTER EXAMINATION

Time-3Hours **MaxMarks-60**

Q I: Major Experiment	-	20Marks
Q II : Minor Experiment	-	15 Marks
Q III :Spotters 3x5	-	15 Marks
Q IV :Record	-	10 Marks
Total	**-**	**60 Marks**

UZO 56

MAJOR ELECTIVE PAPER 1. ECONOMIC ZOOLOGY

Total Credits: 5 **Total Hours: 60**

Objectives

1. To understand the significance of sustainable agriculture, organic farming and waste management using Vermitechnology
2. To acquire knowledge on sericulture, Apiculture and lac culture rearing and harvesting techniques.
3. To inculcate knowledge on poultry and animal husbandry aspects.

UNIT I **12Hrs**

VERMICULTURE & VERMITECHNOLOGY

Vermiculture - Selection of suitable species based on their characteristics, Vermicomposting and their advantages, role of earthworms in sustainable agriculture and organic farming, Miscellaneous uses of earthworms (Poltry, Fisheries and Medicine).

UNIT II **12Hrs**

SERICULTURE

Types of silkworms - Life cycle - Rearing methods - Harvesting - Processing of Silk - Marketing of Cocoons - Economic importance of sericulture - Problems in sericulture.

UNIT III **12Hrs**

APICULTURE AND LAC CULTURE

Types of honey bees - Diseases and pests of bees and lac insects - Harvesting and processing of honey and lac - Marketing of honey and lac - economic importance of apiculture & lac culture.Problems in apiculture and lac culture.

UNIT IV **12Hrs**

POULTRY FARMING

Types of birds for poultry - Diseases and pests of bird - Egg and meat production - poultry feed - Marketing of poultry products - Economic importance of poultry keeping - problems in poultry keeping.

UNIT V **12Hrs**

ANIMAL HUSBANDRY

Types of animals for animal husbandry - Disease and pests of animals - Milk and meat production - Processing of milk and meat products - Marking- Economic importance of animal husbandry - problems in animal husbandry.

Text Books

1. Bhatnagar, R.K and Paltra, R. K. Vermiculture and Vermicomposting. Kalyani Publishers, New Delhi, 1996.
2. Vasantharaj David. B and T. Kumarasami, Elements of Economic Entomology, Popular Book depot, Madras -15, 1982.
3. D.B. Tembhare, Modern Entomology, Himalaya publishing house – Delhi, 1997.
4. M. Madan Mohan Rao. A Text Book of Sericulture. B.S. Publications, Hyderabad. 1998.
5. Ed. Lokeshwar, R. Hand Book of Animal Husbandry, ICAR, New Delhi. 2002.
6. D.R. Khanna & P.R. Yadav , Biology of fishes, Discovery Publishing House, New Delhi. 2004.

Reference Books

1. Nayar K.K and T.N. Anathakrishnan and B.V. David. - General and applied Entomology, Tata McGraw Hill publishing Co. Ltd., New Delhi. pp.589, 1983.
2. Richard and Owen, A.D.Text Book of Entomology. Imms, Vol.I & II Ed. by ELBS, 1997.
3. P.G. Fenemore, A. Prakash, Applied Entomology, New age international (P) publishers - New delhi.2, 2002.
4. Manju Yadav, Economic Zoology, Discovery Publishing House, New Delhi. 2003.
5. Fred V.Theobald, Economic Zoology, Print well Publisher. Jaipur. India, 1989.

UZO 58

MAJOR ELECTIVE- 2 PESTS AND THEIR MANAGEMENT

Total Credits: 5 **Total Hours: 45**

Objectives

1. As an elective subject, applied aspect of Zoology is being included.
2. Study on crop protection is necessary for food grain production.
3. To focuss economical importance mainly in relation to agricultural and medicinal topics.

UNIT I **9Hrs**

Insects of agricultural importance - types of damage on crops - insects in relation to plant diseases.

UNIT II **9Hrs**

Biology, nature of damage on crops and control measures of one major pest of each of the following crops: paddy, sugarcane, cotton and coconut.

UNIT III **9Hrs**

Biology, nature of damage on crops and control measures of plant nematodes, mites, crabs, snails, birds and rats.

UNIT IV **9Hrs**

Insects in relation to public health- biology, role of insect vectors of human and control measures of mosquitoes, house flies, bed bug and head louse.

UNIT V **9Hrs**

Insect pests of stored produces- rice weevil *(Sitophilusoryzae),* Red flour beetle *(Triboliumcastaneum)* and Pulse beetle *(Callosbruchuschinensis).*

Text Books

1. Vasantharaj David. B and T. Kumarasami 1982. Elements of Economic Entomology, Popular Book depot, Madras-15.
2. D.B. Tembhare - Modern Entomology- (2000) Himalaya Publishing House-Delhi.
3. General & Applied Entomology TN Anantha Krishnan 2007. Tata Mc Gran Hill Pub. Co.Ltd.

Reference Books

1. Nayar K.K & T.N. Anathakrishnan and B.V. David. 1983 - General & applied Entomology, Tata McGraw Hill publishing Co. Ltd., New Delhi.pp. 589

2. Applied Entomology - 2002 P.G. Fenemore, A. Prakash New age International (P) publishers- New Delhi.

UZO 59

MAJOR ELECTIVE PAPER-3 VERMITECHNOLOGY

Total Credits: 5 **Total Hours: 45**

Objectives

1. It is a general awareness study programme for UG students to maintain clean environment.
2. To aware the significance of sustainable agriculture and organic farming.
3. To inoculate basic knowledge on recycling of biodegradable waste of different kinds.

UNIT I **9Hrs**

Distribution- different species of earthworm. General body structure- External characters- Body wall- Food and feeding habits digestive system - Gut microflora and their importance - Reproductive system cocoon formation.

UNIT II **9Hrs**

Role of Earthworms in sustainable agriculture - organic farming - Earthworm activities - soil fertility and texture - soil aeration. Vermitechnology - Definition.

UNIT III **9Hrs**

Advantages of vermiculture – Vermi – cast - Decomposition of bio - degradable Wastes and vermicomposing - Selection of suitable species - Basic characteristics of suitable species - Description of suitable species - Maintenance of Base culture.

UNIT IV **9Hrs**

Vermicomposing - Advantages of vermicomposting - small scale vermicomposting - large scale vermi composing. Type of Vermicomposting - requirements for Vermicomposting - maintenance of vermicomposting.

UNIT V **9Hrs**

Recycling of different wastes by vermicomposting - Organic wastes - Solid wastes - Municipal wastes - Animal Dung - Agricultural wastes. Application of Vermicompost - In horticulture- in agriculture.

Text Books

1. Vermiculture and vermicomposting. Bhatnagar, R.K. and Palta, R.K., Kalyani publishers, New Delhi (1996).
2. A text book of Annelida R.L. Kotpal published by RakashK.Rastroji for Rastroji publications Shivaji road Meerut- 250002- (1988).

Reference Book

1. Vermicompost - Crown Jewel of organic farming, R.D. Kale, Author publication, 4-Archana apartment, (S-1), 12th cross, Margosa Rd. Malleswaram, Bangalore-560 003, India (2006).
2. A Hand book of organic forming, Arun K.Sharma, Agrobios, Jothpur, India (2002).
3. The Earthworm book, S.A.Ismail. other India press. Goa 403 507, India (2005).
4. Earthworms in Agriculture, Talashilkar & Dosani. Published by Agrobios (India). Chopasani Road Jodhpur- 342003.
5. The complete technology book on " Vermiculture and Vermicompost" published by National Institute of Industrial Research, Delhi(2004).

UZO 61

MAJOR ELECTIVE PAPER 4

WILD LIFE ECOLOGY AND MANAGEMENT

Total Credits: 5 **Total Hours: 45**

Objectives

1. To make the students understand and appreciate biodiversity and the Act to protect the wild species.
2. To make the students learn different techniques to study wild life and develop knowledge of the benefits of ecosystem.
3. To make the students analytically know about various methods to conserve biodiversity**.**

UNIT I **9Hrs**

Ecosystem aquatic ecosystem- Pond, terrestrial ecosystem- forest trophic relations in ecosystems, foodchain, foodweb, ecological pyramids - productivity of ecosystem-primary and secondary production. Energy flow in ecosystem. Biotic community and ecological niche.

UNIT II **9Hrs**

Wild life of India – Ecological sub regions of India. Endangered flora and fauna. Wild life management in India - Indian board for wild life. Protected areas network. National parks and sanctuaries. Special projects for endangered species.

UNIT III **9Hrs**

BIODIVERSITY

Biodiversity-kinds of biodiversity; Biogeography-continental shift, zoogeography, biodiversity hot spots, endemicity; biodiversity assessment; Endagered species-Indian Wild life protection Actl972 and International Redlist Species Criteria, concept and assessment

UNIT IV **9Hrs**

FIELD SAMPLING TECHNIQUES

Population estimation-concept, line transect, quadrate sampling; Animal Trapping Techniques – Pitfall funnel, Sherman traps; marking and recapture techniques; use of indirect evidences in species inventory; Basic methods in behavioral and food habit studies; Wildlife management techniques.

UNIT V **9Hrs**

ECOSYSTEM SERVICES

Animal plant interactions-pollinators, seed dispersal, biological pest control, vector; Wildlife products - food, medicine, Germplasm, domestication; Ecological balance - prey predator relationships. herbivory and scavengers.

Text Book:

1. Ecology and Environment. P.D.Sharma. 2009/10th Ed. Rastrogi publications. Meerut.
2. Concepts in Wild Life Management Hoselli BB (2008) Daya publishing house New Delhi 110002.

References

1. Ecology and evolution of communities. Cody, M.L.and J.M Diamond 1975.Harvard University Press.Cambridge. Wildlife Management Techniques. Giles.H. 1984. Natraj Publishers, Dehra Dun.
2. Fundamentals of Wildlife Management. Gopal, R. 1992. Justice Home. Allahabad. Biodiversity - Gaston, K.J. 1996.
3. A biology of numbers and difference. Blackwell Science, Oxford. Ecology. V.K.Agarwal and Usha Gupta. 2004. 1st Ed. S.Chand and Company Ltd.New Delhi.
4. Environmental Studies. D.K.Asthana and Meerut Asthana. 2006 1st Ed. (Reprint 2007). S. Chand and company Ltd. New Delhi.
5. Fundamentals of Ecology. Madhab Chandra Desh and Sathya Prakash Desh. 2009. 3rd Ed. Tata McGraw Hill Education Pvt.Ltd. New Delhi.

UZO 63

MAJOR ELECTIVE PAPER – 5. POULTRY SCIENCE AND MANAGEMENT

Total Credits:5 **Total Hours:45**

Objective

1. To make the students develop knowledge on the history and the role of poultry in rural development and its structure.
2. To make the students learn methods of rearing, breeding and production of poultry.
3. To make the students know about the preparation of feed antibiotics, vaccines and marketing.

UNIT I **9Hrs**

History and importance of Poultry farming, Role of the Poultry in rural development, employment potential, Economics and contribution to national productivity, Egg production, Table bird production, manure as by-product. Anatomy and physiology of poultry birds with reference to digestive and reproductive system.

UNIT II **9Hrs**

Breeds of poultry birds and scientific methods of breeding Hybrid and cross breed. Indian and exotic selecting chicks and parents for production factors in selection, Hatching, selecting eggs for hatching, Natural and artificial incubations, Types of incubators. Maintenance of temperature and humidity sterilization of room during hatching, separation and selling.

UNIT III **9Hrs**

Poultry house and equipment, space requirement, types of house, number birds, equipments for feeding, protection from enemies and adverse conditions.

UNIT IV **9Hrs**

Nutrition of Poultry birds, requirement according to age feed formulation, classification of feed stuffs. Milling by products, distilleries and brewery by products. Availability of raw materials and their cost, food grinders and mixtures, use of antibiotics.

UNIT V **9Hrs**

Brooding and rearin, sexing, vaccination, natural and artificial breeding, types of brooding, temp. requirement culling. Debreaking, characters of good layers and broilers caponettes and and capons, rearing of chicks.

Text Books

1. A Hand book of poultry practice. Keith Wilson (2007) 2nd Ed. Agrobios (India), Jodhpur.
2. The poultry science L.C.R. Norris Elye. 2005. Biotech books.Delhi.35.

Reference Books

1. Economic Zoology: Manju Yadav.2003. 1st Ed. Discovery publishing house. New Delhi
2 Feeding of Poultry. B. Pande. V.R.Reddy, V.R.Sadagopen and A.K.Shrinivasan. 1984 (reprinted 1997), Indian council of Agricultural research. Power Printers New Delhi.
3 Poultry farm guide. Dr.R.Venkatakrishnan, 1995. 1st Ed. Balaji publications. Madras.
4 Hand book of Animal Husbandry Indian Council of Agricultural Research 1997. 2nd Ed. (reprint) published by Dr.R.D.Sharma, Director Directratre of Publications and information on Agriculture. New Delhi.

UZO 65

MAJOR ELECTIVE 6 - HUMAN GENETICS AND COUNSELLING

Total Credits: 5 **Total Hours: 45**

Objectives

1. To make the students develop knowledge on the blood types, transfusion and diseases.
2. To make the students know about applications of aminocentesis, dermatoglyphics and Population genetics.
3. To make the students learn applications of Genetic engineering and Genetic counseling.

UNIT I **9Hrs**

Blood groups (major types) Blood transfusion, Erythroblastosisfoetalis.

Physiology and genetic of blood groups.

UNIT II **9Hrs**

Aminocentesis, Dermatoglyphics: Terminology, methods of observation and printing, dermatoglyphic features of syndrome.

UNIT III **9Hrs**

Population genetics, Hardy-Weinberg principle and its application in human population.

UNIT IV **9Hrs**

Genetic engineering and its applications in human being, Cancer, AIDS.

UNIT V **9Hrs**

Genetic counseling, definition, aims, procedure in genetic counseling and its limitation. Pedigree chart and its uses.

Text Books

1. Genetics. Veer Bala Rastrogi. 2009 (reprint 2010) 3rd Ed. Kadarnath Ramnath publishers. Meerut. New Delhi.
2. Genetics. Alice Marcus.2009.MJP Publishers, Chennai.

References

1. Ursula Goodenough(1984)–3rd Edit. Saunders College Publishing.
2. Genetics by H. Eldon Sutton, Robert P. Wagner (1985) - Macmillan publishing company New York.
3. Basic Human Genetics. Elaine J. Mange and Arthur P. Mange (1991). 2nd Edit. Sinaver Associates Inc. publishers Sunder land.
4. Principles of Genetics. Robert H. Tamarin. 2002. 7th Ed. Tata McGraw Hill publication company Ltd. New Delhi.
5. Applied Genetics. C.Emmanuel, S. Ignachimuthu and S.Vincent. 2006. MJP Publishers, Chennai.
6. Genetics. Susan L. Elrod and William D.Stansfield. Adapted by G. Bhowmik 2009 4th Ed. Mc Graw - Hill publication company Ltd. New Delhi.
7. Cell and Molecular Biology. P.J.Russel, S.L.Wolte, P.E.Hertz, C.Sterr and B.Mc Millan.2009 1st Ed. (Indianprint), Cengage learning India Pvt. Ltd. New Delhi.

15UZO6S4

VI - SEMESTER

SKILL BASED SUBJECT 4 COMMERICIAL FISH CULTURE

Total Credits: 3 **Total Hours: 30**

Objectives

1. Developing the knowledge in characteristics, structure and resources of fisheries.
2. Increase sector performance by production, culture practices and farm management.
3. Develop the trade and contribution to the economy.

UNIT I **Introduction** **6Hrs**

i. Scope of fish culture.
ii. Freshwater resources- ponds, lakes, rivers, dams

UNIT II **Commercially important fish species** **6Hrs**

Criteria for species collection, Murrels, major carps, minor carps and others.

UNIT III **Fish Pond** **6Hrs**

Site selection, design and construction of artificial ponds. Water quality characteristics and management, culture practices.

UNIT IV **Nutritional requirement** **6Hrs**

Feeding habits, supplementary feed, artificial feed and feed formulation.

UNIT V **Farm Management** **6Hrs**

Weed control, harvesting of fishes and economics.

Text books

1. C.B.L Srivasta 2002, A text book of fishery science and Indian fisheries, kitab Mahal, Allahabad.
2. Dr. N. Arumugam2008, Aquaculture, Saras Publication, Nagercoil.

Reference books

1. Santhanam, R. 1990. *Fisheries Science*, Daya publishing House, New Delhi.
2. Rath, R.K. 2000. Fresh water Aquaculture, Scientific (India), Jodhpur.
3. Venkataramanujam, K. Ramanathan, N., and Venkataramani, V.K. 1997. *Introduction to Fishery Science*, Janshi, Tuticorin.

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15UZO1A1

I - SEMESTER

Allied A. Paper l. NON-CHORDATA AND CHORDATA

Total Credits:4 **Total Hours: 75**

(For Chemistry, Plant Biology and Plant Biotechnology & Biochemistry)

Objectives

1. To learn the animal distribution.
2. To understand the functions of all living system.
3. To improve the knowledge of Non - Chordata and their significance in biology.

UNIT I **15Hrs**

Phylum Protozoa	:	Paramecium
Phylum Porifera	:	Leucosolenia
Phylum Coelenterata	:	Obelia

UNIT II **15Hrs**

Phylum Platyhelminthes	:	Fasciola hepatica
Phylum Aschelminthes	:	Ascaris lumbricoides
Phylum Annelida	:	Earthworm - Megascolexmauritii

UNIT III **15Hrs**

Phylum Arthropoda	:	Cockroach
Phylum Mollusca	:	Pila
Phylim Echinodermata	:	Starfish

UNIT IV **15Hrs**

Phylum Chordata	:	Shark, Frog, Calotes (Excluding endoskeleton)

UNIT V **15Hrs**

Pigeon, Rabbit (Excluding endoskeleton)

Text Books

1. N. SoundaraPandian, T. Murugan, N.C.Nair, S Leelavathi and Prof. N. Arumugam 2010.Invertebrate Zoology Vol. 1, Seventh revised edition ,Saras Publications, Nagercoil, Tamilnadu.
2. Thangamani, L.M. Narayanan, S.Prasannakumar and Prof. N. Arumugam 2010.Chordate Zoology Vol.2.Seventh revised edition,Saras Publications, Nagercoil, Tamilnadu.

Reference Books

1. Prof. M. Ekambaranatha Ayyar and Prof. T.N.Ananthakrishnan - S.Viswanathan 1981.Manual of Zoology Vol. 1 & Vol.2.Printers & Publishers Pvt.Ltd, Chennai.
2. R.L. Kotpal, 2009. Modern Text book Zoology INVERTEBRATES (Animal Diversity- 1). Rastogi Publications, Meerut - India.
3. R.L. Kotpal, 2009. Modern Text book Zoology CHORDATES (Animal Diversity - II) Rastogi Publications, Meerut - India.

15UZO2A2

II - SEMESTER

Allied A-Paper 2 CELL BIOLOGY, GENETICS, EMBRYOLOGY, PHYSIOLOGY, ECOLOGY & EVOLUTION

Total Credits: 4 **Total Hours: 75**

(For Chemistry, Plant Biology and Plant Biotechnology & Biochemistry)

Objectives

1. To learn the outline of Zoology.
2. To understand the basic concepts of Zoology.
3. To learn the relationship between organism and environment.

UNIT I **15Hrs**

Structure of an animal cell, structure and functions of Mitochondria, Golgi body, Centrosome, Lysosomes and Nucleus.Mendel's laws of inheritence, Human genetic disorders-haemophilia and colour blindness.

UNIT II **15Hrs**

Types of vertebrate eggs. Cleavage, blastulation and gastrulation in Frog

UNIT III **15Hrs**

Nutrition in man-Food constituents and enzymes, digestion and absorption.

UNIT IV **15Hrs**

Ecosystem and its components, food chain, energy flow, Pollution of water, air and noise.

UNITV **15Hrs**

Evidences of Evolution - morphological, anatomical, embryological and biochemical. Theories of evolution - Lamarkism, Darwinism and De Vries, Mutation theory.

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Text Books

1. Prof. N.Arumugam and R. Meyyan, 2010. Cell Biology, Genetics and Evolution. Seventh edition. Saras Publications, Nagercoil, Tamilnadu
2. Prof. N.Arumugam, 2010. Embryology, Ecology and Physiology. Seventh edition.Saras Publications, Nagercoil, Tamilnadu.

Reference Books

1. P.S. Verma and V.K. Agarwal, 1999.Cytology, Genetics & Embryology. S.Chand & Company Ltd, New Delhi.
2. Veer Bala Rastogi and M. S. Jayaraj 2008. Physiology, Ecology and Evolution. Kedar Nath Ram Nath Publishers, Meerut, New Delhi.

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15UZO2AL

II - SEMESTER

Allied – A - PRACTICAL – I

Total Credits : 2

Experiment I:

Virtual laboratory: Observation of various systems of any one Invertebrate & Frog or Rat (Digestive system, Arterial system, Venous system, Reproductive system - male & female) over computer.

Experiment II: Spotters

Animals: Paramecium conjugation, Sycon, Obelia colony, Liver fuke, Earth worm, Prawn, Pila, Star fish, Amphioxus, Shark, Toad, Chameleon, Horn Bill and Bat.

Cell Biology: Columnar epithelium & Bone tissue T.S.

Cell division: Stages of Mitosis: Interphase, Prophase, Metaphase, Anaphase and Telophase.

Genetic Syndromes : Downs, Klinefelter and Turner's (Picture).

Adaptive radiation: Fore limb Skeleton of vertebrates (Picture).

Embryology: Frog : ovum (picture), spermatozoa (Picture), 2 cell stage, 4 cell stage, 8 cell stage: Blastula (VS), Gastrula VS and Tadpole (4mmWM).

Experiment III:

Ecology: Observation of Plankton (any five).

Reference Books:

1. P.S.Verma, 1983. A Manual of Practical Zoology by Invertebrate. 5th Edition. S.Chand & Company Limited, New Delhi.

2. P.S.Verma, 1983. A Manual of Practical Zoology by Vertebrate. 5th Edition. S.Chand & Company Limited, New Delhi.

3. J.Sinha, A.K.Chatterjee and P.Chattopadhyay, 2011. Advanced Practical Zoology. 2nd Edition. Books and Allied (P) Ltd, Kolkatta.

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15UZO2AL

QUESTION PATTERN

Time 3 hours **Max 30 marks**

Question I. Virtual laboratory

(one of the systems – identification & notes) = 7 marks

Question II. Spotters – Identify and Comment on (5x3) = 15 marks

Question III. Observe any one plankton from the given sample = 03 marks

Question IV. Record = 05 marks

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QUESTION PAPER PATTERN for CIA and ESE

Theory (Core)

Maximum marks 75

Section A (10 x 1 = 10 marks)

Q.No. 1 to 10 : Multiple choice type alone with four distractors each.

Section B (5 x 5 = 25 marks)

Q.No. 11 to 15 : Either or / short notes type questions (one question 'a' or 'b' from each unit).

Section C (5 x 8 = 40 marks)

Q.No. 16 to 20 : Either or / essay type questions (one question 'a' or 'b' from each unit).

Break up Marks for CIA of Theory

CIA Exam	-	15
Assignment	-	5
Attendance	-	5
Total		25

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UZO 75

QUESTION PAPER PATTERN for CIA and ESE

Theory (Allied)

Maximum marks 55

Section A (10 x 1 = 10 marks)

Q.No. 1 to 10: Multiple choice types alone with four distractors each.

Section B (5 x 3= 15 marks)

Q.No. 11 to 15 : Either or / short notes type questions (one question 'a' or 'b' from each unit).

Section C (5 x 6 = 30 marks)

Q.No. 16 to 20 : Either or / essay type questions (one question 'a' or 'b' from each unit).

Break up Marks for CIA of Theory

CIA Exam	-	10
Assignment	-	5
Attendance	-	5
Total	-	20

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