Vellalar College for Women (Autonomous), Erode - 12.

Bachelor of Science in Zoology

2016 - 17 onwards

Course Content and Scheme of Examinations (CBCS Pattern)

Semester I

Part	Study Components	Subject Code	Title of the Paper	Inst. Hrs./ Week	Exam. Dur. Hrs.	Max. Marks			Credits
						CIA	ESE	Total	
I	Language I	15TAMU101/ 14HINU101	Tamil / Hindi Paper I	6	3	25	75	100	3
II	Language II	13ENLU101	English Paper I	6	3	25	75	100	3
III	Core	16ZOUC101	Invertebrata I	3	3	25	75	100	4
		16ZOUC102	Invertebrata II	3	3	25	75	100	4
		16ZOUCP01	Practical I Based on C_1,C_2,&C_3	3	3	-	-	-	-
	Allied - I	16BOUA101	Botany Paper I	4	3	20	55	75	4
		16BOUAP01	Botany Practical Based on Paper I & II	3	3	-	-	-	-
IV	Foundation Course	09FOCUIES	Environmental Studies	2	3	-	100	100	2
							Total	**575**	**20**

Semester II

I	Language I	15TAMU202/ 15 HINU202	Tamil / Hindi Paper II	6	3	25	75	100	3
II	Language II	13ENLU202	English Paper II	6	3	25	75	100	3
III	Core	16ZOUC203	Chordata	6	3	25	75	100	4
		16ZOUCP01	Practical I Based on C_1,C_2,&C_3	3	3	40	60	100	4
	Allied I	16BOUA202	Botany Paper II	4	3	20	55	75	4
		16BOUAP01	Botany Practical Based on Paper I & II	3	3	20	30	50	2
IV	Value Education	14VEDU2HR	Value Education and Human Rights	2	3	-	100	100	2
							Total	**625**	**22**

Semester III									
Part	**Study Components**	**Subject Code**	**Title of the Paper**	**Inst. Hrs./**	**Exam. Dur.**	**Max. Marks**			**Credits**
						CIA	**ESE**	**Total**	
I	Language I	14TAMU303/ 14HINU303	Tamil / Hindi Paper III	6	3	25	75	100	3
II	Language II	13ENLU303	English Paper III	6	3	25	75	100	3
III	Core	09ZOUC304	Developmental Biology & Evolution	4	3	25	75	100	4
		14ZOUCP02	Practical II Based on C_4 & C_5	2	-	-	-	-	-
	Allied II	11CHUA001	Chemistry Paper I	4	3	20	55	75	4
		15CHUAP01	Chemistry Practical Based on Paper I & II	3	-	-	-	-	-
IV	Skill Based Subject I			3	3	25	75	100	3
	Basic Tamil	-	-	2	-	100	-	100	2
	Advanced Tamil				3	25	75		
	Non - Major Elective I				3	-	100		
							Total	**575**	**19**
Semester IV									
I	Language I	14TAMU404/ 14HINU404	Tamil / Hindi Paper IV	6	3	25	75	100	3
II	Language II	13ENLU404	English Paper IV	6	3	25	75	100	3
III	Core	08ZOUC405	Environmental Biology & Animal Behaviour	4	3	25	75	100	4
		14ZOUCP02	Practical II Based on C_4 & C_5	2	3	40	60	100	4
	Allied II	11CHUA002	Chemistry Paper II	4	3	20	55	75	4
		15CHUAP01	Chemistry Practical Based on Paper I & II	3	3	20	30	50	2
IV	Skill Based Subject II	13ZOUS402	Multi Skill Development Paper	3	1*	40	60*	100	3
	Basic Tamil	-	-	2	-	100	-	100	2
	Advanced Tamil				3	25	75		
	Non - Major Elective I				3	-	100		
							Total	**725**	**25**

* Online Examination

Semester V									
Part	**Study Components**	**Subject Code**	**Title of the Paper**	**Inst. Hrs./**	**Exam. Dur.**	**Max. Marks**			**Credits**
						CIA	**ESE**	**Total**	
III	Core	08ZOUC506	Cell Molecular Biology & Genetics	5	3	25	75	100	4
		08ZOUC507	Microbiology & Immunology	5	3	25	75	100	4
		09ZOUC508	Biostatistics, Bioinformatics & Computer Applications	4	3	25	75	100	4
		10ZOUC509	Human Genetics & Counselling	4	3	25	75	100	4
		14ZOUCP03	Practical III Based on $C_{6,}$ $C_{7,}$ $C_{8,}$ & C_{9}	2	-	-	-	-	-
		14ZOUCP04	Practical IV Based on C10, C11 & C12	3	3	-	-	-	-
	Elective	14ZOUE501	Dairy Science	4	3	25	75	100	4
IV	Skill Based Subject III			3	3	25	75	100	3
							Total	**600**	**23**
Semester VI									
		14ZOUC610	Biophysics, Biochemistry and Bioinstrumentation	4	3	25	75	100	4
III	Core	14ZOUC611	Physiology & Endocrinology	6	3	25	75	100	4
		14ZOUC612	Biotechnology	6	3	25	75	100	4
		14ZOUCP03	Practical III Based on $C_{6,}$ $C_{7,}$ $C_{8,}$ & C_{9}	2	3	40	60	100	4
		14ZOUCP04	Practical IV Based on C10, C11&C12	3	3	40	60	100	4
	Elective	08ZOUE602	Vermiculture	4	3	25	75	100	4
		11ZOUEP01	Elective Practical Based on Elective I & II	2	3	40	60	100	3
IV	Skill Based Subject IV			3	3	25	75	100	3
V	Extension Activity	-	NCC / NSS / Physical Education /YRC/Green Society/CCC/EDP	-	-	-	-	100	1
							Total	**900**	**31**
Total I - VI Semester								**4000**	**140**

SKILL BASED SUBJECTS				
S.NO	**Subject Code**	**Semester**	**Title of the paper**	
1.	11ZOUS301	III	Ornamental Fish Culture	Cafeteria
2.	13ZOUS402	IV	Multi skill	-
3.	11ZOUS503	V	Poultry Husbandry	Cafeteria
4.	11ZOUS604	VI	Sericulture	Cafeteria

NON - MAJOR ELECTIVES				
S.NO	**Subject Code**	**Title of the paper**		
1.	14TMLU301/ 14TMLU402	*Basic Tamil		
2.	14ADTU301/ 14ADTU402	** Advanced Tamil		
3.	09ZOUN301/ 09ZOUN402	Non Major Elective	Wild Life Management / Public	

**For students where part- I in secondary education is not Tamil

*For students where part I in Higher secondary education is not Tamil

SELF LEARNING PAPER (OPTIONAL)						
S.NO	**Subject Code**	**Title of the paper**	**Exam. Dur. Hrs**	**Max. Marks**	**Credits**	
1.	13ZOUSL04	Apiculture	3	100	5	
2.	13AUGSL05	General Awareness	3	100	5	

Allied Zoology (For Botany Students)					
S.No	**Subject code**	**Title of the paper**	**Exam Dur .Hrs**	**Max. Marks**	**Credits**
1	16ZOUA101	Invertebrata and Chordata	3	75	4
2	16ZOUA202	Applied Zoology	3	75	4
3	16ZOUAP01	Allied Zoology Practical	3	50	4

SELF LEARNING PAPER (OPTIONAL)						
S.NO	**Subject Code**	**Title of the paper**	**Exam. Dur.Hrs**	**Max. Marks**	**Credits**	
1.	13ZOUSL04	Apiculture	3	100	5	
2.	13AUGSL05	General Awareness	3	100	5	

SKILL BASED SUBJECTS				
S.NO	**Subject Code**	**Semester**	**Title of the paper**	
1.	11ZOUS301	III	Ornamental Fish Culture	Cafeteria
2.	13ZOUS402	IV	Multi skill Development Paper	-
3.	11ZOUS503	V	Poultry Husbandry	Cafeteria
4.	11ZOUS604	VI	Sericulture	Cafeteria

NON - MAJOR ELECTIVES				
S.NO	**Subject Code**	**Title of the paper**		
1.	10TMLU301/ 10TMLU402	*Basic Tamil		
2.	09ADTU301/ 09ADTU402	** Advanced Tamil		
3.	09ZOUN301/ 09ZOUN402	Non Major Elective	Wild Life Management / Public Health and Hygiene	

**For students where part- I in secondary education is not Tamil
*For students where part I in Higher secondary education is not Tamil

Allied Zoology (For Botany Students)					
S.No	**Subject code**	**Title of the paper**	**Exam Dur .Hrs**	**Max. Marks**	**Credits**
1	16ZOUA101	Invertebrata and Chordata	3	75	4

2	16ZOUA202	Applied Zoology	3	75	4
3	16ZOUAP01	Allied Zoology Practical	3	50	4

SEMESTER- I

Core paper- I

INVERTEBRATA- I

Instructional Hrs: 45 **Sub.Code:16ZOUC101**
Max.Marks: CIA-25; ESE-75 **Credits: 4**

Objectives: To understand the basic aspects of classification, structural and functional details of invertebrates.

UNIT I **9Hrs.**

PhylumProtozoa **:**Classification upto orders and their distinguishing characters with suitable examples.

Type study **: Paramecium caudatum**- External features - Nutrition Locomotion - Reproduction - Asexual - Binary fission, Sexual reproduction - Conjugation, Autogamy, Endomixis, Hemimixis and Cytogamy.

General topic : *Protozoan human diseases.*

UNIT II **8 Hrs.**

Phylum Porifera **:** Classification upto orders and their distinguishing characters with suitable examples.

Type study **:** **Leucosolenia botryoides** (Ascon sponge) – External features-Body wall - Spicules - Canal system - Nutrition- Reproduction

General topic **:***Canal system in sponges.*

UNIT III **9 Hrs.**

PhylumCoelenterata: Classification upto orders and their distinguishing characters with suitable examples.

Type study **:** **Obelia geniculata**- External features- Histology of the colony- Cnidoblast and its functions- Nutrition- Reproduction - Life history.

General topic: *Polymorphism in Coelenterates.*

UNIT IV **9 Hrs.**

PhylumHelminthes : Classification upto orders and their distinguishing characters with suitable examples.

Type study **:** **Taenia solium** (Tape worm) - External features - Body wall -Feeding - Respiratory system - Excretory system - Nervous system - Reproductive system- Life cycle.

General topic **:** *Parasitic adaptation in Helminthes.*

UNIT V **10 Hrs.**

Phylum Annelida **:**Classification upto order level. Salient features - examples.

Type study **:Megascolex mauritii** (Earth worm) - External features - Body wall - Coelom - Locomotion - Digestive system -Circulatory system - Excretory system - Nervous system - Reproductive system.

General topic: *A brief account on Vermiculture.*

Note: *Italics* denotes topics for self study.

TEXT BOOK

1. Arumugam N., et.al.,*Text book of Invertebrates*, Saras publication, Nagarcoil, 2014.

REFERENCE BOOKS

1. **Barnes R.D.,***Invertebrate Zoology*, Holt saunders International, VII Edn., 2004.

2**. Barrington E.J.W.,***Invertebrates - Structure and function*, ELBS and Nelson, 2nd Edn., 1979.

3**. Ekambaranth Ayyar and Ananthakrishnan T.N.,***A Manual of Zoology*, Vol.I (Invertebrata)

Part I & II . Viswanathan.S, Pvt. Ltd., Chennai, 1992.

4**. Jordon E.L. and Verma P.S.,** *Invertebrate Zoology,* S.Chand & Co.,New Delhi, Revised Edition 2014

5**. Kotpal, R.L**., *Modern Text Book of Zoology -Invertebrates*, Rastogi Publication, Meerut, Revised Edition 2014.

SEMESTER - I
Core paper - II
INVERTEBRATA - II

Instructional Hrs.: 45 **Sub.Code :16ZOUC102**
Max. Marks: CIA- 25; ESE-75 **Credits : 4**

Objectives : To understand habitat, adaptations, organisation and taxonomic status of Invertebrates.

UNIT I **10Hrs.**

Phylum Arthropoda : Classification upto orders and their distinguishing characters with suitable examples.

Type study **:Penaeus indicus** (Marine Prawn) - External features- Appendages - Body wall - Body cavity - Digestive system - Circulatory system - Respiratory system - Excretory system - Nervous system - Reproductive system - *Life history*.

UNIT:II **8Hrs.**

Type study **:Periplaneta americana** (Cockroach) - External Features -Body wall- Body cavity - Mouth parts - Digestive system - Blood vascular system - Respiratory system -Excretory system - Nervous system – Reproductive system

General topic **:** *Beneficial insects*.

UNIT III **9Hrs.**

Phylum Mollusca **:** Classification upto orders and their distinguishing characters with suitable examples.

Type study **:Pila globosa** (Apple snail) - Shell - Body organization- Digestive system - Respiratory system - Circulatory system - Excretory system - Nervous system - *Sense organs* - Reproductive system.

UNIT IV **8Hrs.**

Type of study **: Sepia** (Cuttle fish) - External features - Colour change -Locomotion-Digestive system - Ink gland - Respiratory system - Circulatory system - Nervous system - Excretory system - Reproductive system.

General topic **:** *Economic importance of Mollusca.*

UNIT V **10Hrs.**

Phylum Echinodermata **:** Classification upto orders and their distinguishing characters with suitable examples.

Type study **: Asterias rubens** (Star fish) - External features- Pedicellaria structure and function - Digestive system -

Respiratory system - Water vascular system – Circulatory system- Excretory system - Reproductive system- *Life*

General topic **:** Larval forms of echinoderms and their evolutionary significance

Note: *Italics* denotes topics for self study.

TEXT BOOK

1.**Arumugam N., et.al.,***Text book of Invertebrates,* Saras Publication, Nagercoil, 2014.

REFERENCE BOOKS

1. **Ekambaranath Ayyar and Anantha Krishnan T.N.,***A Manual of Zoology* ,Vol.1 (Part I & II), S.Viswanathan Pvt.Ltd., Chennai, 1995.
2. **Jordan E.L. and Verma P.S.,***Invertebrate Zoology,* S.Chand & Co., New Delhi, 2000.
3. **Kotpal R.L.,***Modern Text Book of Zoology Invertebrates,* Rastogi Publication, Meerut, India, 2006.
4. **Majupuria** T.C., *Introduction of Invertebrates,* S.Nagin & Co., Delhi, 1973.

SEMESTER - II
Core Paper - III
CHORDATA

Instructional Hrs: 90 hrs. **Sub. Code: 16ZOUC203**
Max. Marks : CIA- 25; ESE-75 **Credits: 4**

Objective: To understand the diversity, adaptation, organization and taxonomic status of chordates.

UNIT I **25 Hrs.**

Chordata **:** Classification and General characteristics

Prochordata **:** Classification and General characteristics

Type study **:Branchiostoma lanceolatum** (Amphioxus) - External features -Body wall - Atrium - Coelom - Notochord - Digestive system - Circulatory system - Excretory system - Nervous system - Reproductive system.

Class Pisces **:** Salient features-Classification upto orders with two suitable examples

Type study **: Scoliodon sorrakowah** (Shark) - External features - Fins - Placoid scales - Digestive system - Respiratory system - Circulatory system - Nervous system- Sense organs - Urinogenital system.

General topic **:** *Parental care in fishes.*

UNIT II **15 Hrs.**

Class Amphibia **:**Salient features- classification upto orders withtwo suitable examples

Type study **:Rana hexadactyla** (Frog) - External features - Sexual dimorphism - Skin - Chromatophores and Colour change - Coelom - Locomotion- Digestive system - Respiratory system - Circulatory system - Nervous system - Sense organs - Urinogenital system - *Life cycle*.

General topics **:** Neoteny.

UNIT III **15 Hrs.**

Class Reptilia **:** Salient features- classification upto orders withtwo suitable examples

Type study **:Calotes versicolor** (Garden Lizard) - External features- Body cavity- Digestive system- Respiratory system- Circulatory system- Nervous system- Sense organs- Excretory system- Reproductive system.

General topic **:** *Poisonous snakes of South India.*

UNIT IV **15 Hrs**.

Class Aves **:** Salient features- Classification upto orders with two suitable examples.

Type study **:Columba livia** (Pigeon) External features –

Exoskeleton - Digestive system - Circulatory system- Respiratory system- Flight and flight muscles - Mechanism of flight - Nervous system - Sense organs- Excretory system - Reproductive system.

General topic **:** Migration in birds.

UNIT V **20 Hrs**.

Class Mammalia **:**Salient features- Classification upto orders with suitable two examples.

Type study **:Oryctolagus cuniculus** (Rabbit) - External features - Integument - Coelom - Abdominal cavity - Digestive system - Circulatory system- Respiratory system- Nervous system- Sense organs- Urinogenital system.

General topic **:** *Aquatic mammals.*

Note: *Italics* denotes topics for self study.

TEXT BOOK

1. **Arumugam N., et.al.,***Text book of Chordates,* Saras Publication, Nagercoil, 2014.

REFERENCE BOOKS

1.**Ekambaranath Ayyar and Anantha Krishnan T.N.,***A Manual of Zoology* ,Vol.2 (Part I & II), S.Viswanathan Pvt.Ltd., Chennai, 1995.
2. **Jordan E.L. and Verma P.S.,***Chordate Zoology,* S.Chand & Co., New Delhi, 2014.
3. **Kotpal R.L.,***Modern Text Book of Zoology Vertebrates,* Rastogi Publication, Meerut, India, 2010.
4. **Majupuria T.C.,** *Introduction of Chordates,* S.Nagin & Co., Delhi, 6th Edition 1976.

SEMESTER - I & II
Core Practical - I
(Based on C_1, C_2 and C_3)

Instructional Hrs: 90 **Sub.Code:16ZOUCPO1**
Max. Marks: CIA- 40; ESE-60 **Credits: 4**

LABORATORY EXERCISES:

1. **COCKROACH** - Digestive system, Nervous system, Male and Female Reproductive system (Through charts)
2. **FROG** - Digestive system, Arterial system, Venous system, Male and Female Urinogenital system (Virtual Dissection)

MOUNTINGS:

3. **EARTHWORM** - Body setae
4. **CHICK** - 48 and 72 hours embryo (Slides)

EXPERIMENTS:

5. Culturing and identification of Amoeba.
6. Culturing and identification of Paramecium.
7. Observation - Butterfly Life cycle.
8. Identification and determination of morphometric characters of fresh water fishes. (Any five)
9. Study of metamorphosis in Frog
10. Observation of beak modification in birds.
11. Observation of feet modification in birds.
12. Collection and identification of different types of feathers in birds.

FIELD STUDY -Observation and identification of any 15 insects.
Report must be submitted along with record note book.

SPOTTERS:

A.CLASSIFY GIVING REASONS:

Paramecium, Obelia, Taenia solium, Earthworm, Prawn, Starfish, Shark, Frog, Pigeon, Rabbit.

B.DRAW LABELLED SKETCH :

Obelia medusa, T.S of Earthworm, T.S. of Taenia solium, Frog- Skull (Dorsal view and ventral view), Pectoral and Pelvic girdle.

C. COMMENT ON BIOLOGICAL SIGNIFICANCE:

Sponge gemmule, Physalia, Peripatus, Axolotyl larva, Limulus, Chaemeleon.

D. RELATE STRUCTURE AND FUNCTION:

Spicules of Sponges, Scolex of Taenia, Parapodium of Nereis, Body setae of Earthworm, Mandible of Cockroach, Radula of Pila, Placoid scale, Quill feather.

E. WRITE DESCRIPTIVE NOTES:

Sea anemone, Lepas, Mysis larva, Bipinnaria Larva, Octopus, Hippocampus, Exocoetus, Rhacophorus, Cobra, Bat.

SEMESTER-III

Core paper-IV

DEVELOPMENTAL BIOLOGY & EVOLUTION

Instrutional Hrs. :60 **Sub.Code:09ZOUC304**

Max.Marks: CIA-25;ESE-75 **Credits: 4**

Objectives: 1. To understand the basic concepts in Embryology.

2. To know the diversity of animal life in earth and mechanism of their evolution.

UNIT I **12 Hrs**

Gametogenesis – Spermatogenesis – Oogenesis - *Fertilization.*

UNITII **12Hrs**

Types of eggs, patterns of cleavage, Blastulation and Gastrulation in Frog.

Morphogenetic movements, *Fate map.*

UNIT III **12 Hrs**

Development of eye and heart in frog. IVF (Basic concepts only). *Embryonic stem cells* (Basic concepts only). Placentation in mammals.

UNIT-IV **12 Hrs**

Concepts of Evolution, Origin of life, Fossils and Fossilization, *Dating of fossils*, Geological time scale.

UNIT-V **12 Hrs**

Speciation, *Polymorphism,* Isolation & Isolating mechanism, Evolution of man.

Note: *Italics* denotes topics for self study.

TEXT BOOKS

1**.Arumugam N.,** *A text book of Embryology* , Saras publication, Nager coil, 1974.

2.**Arumugam N.,** *Organic Evolution*,Saras publication,Nagercoil,2002.

REFERENCE BOOKS

1.**Balinsky B.L.,** *An Introduction to Embrology,* W.B. Saunders Company, Philadelphia & London,1970.

2. **Berril N.J.,** *Developmetal biology,* MC Grew Hill New York,1971.

3. **Verma P.S. and Agarwal V. K.,** *Concepts of Evolution,* S. Chand and Co., New Delhi.

.

SEMESTER – III

Skill Based Subject – 1

ORNAMENTAL FISH CULTURE

Instructional Hrs. : 45 **Sub.Code: 11ZOUS301**

Max. Marks : CIA – 25 ; ESE - 75 **Credits:3**

Objectives : To acquire the basic knowledge of fish culture, in setting up, maintenance and management of different ornamental fishes **.**

UNIT I **9 Hrs.**

Aquarium –Definition, aim, Types. Requirements for an aquarium- Setting an aquarium. Types of tanks. *Variety of aquarium plants.*

UNIT II **9 Hrs.**

Freshwater ornamental fishes - Gold fish - Angel fish –Fighter fish –Guppy – *Zebra fish –Tiger fish* - Gourami –Sword tail.

UNIT III **9 Hrs.**

Fish feed – Nutritional requirements, composition and ratio. Principles of feed formulation. Live feed culture - Daphnia- Artemia- *Spirulina.*

UNIT IV **9 Hrs.**

Artificial feed- feed ingredients and classification. Quality of feed –Preparation of artificial feed- *Types of artificial feed.*

UNIT V **9 Hrs.**

Problems in artificial feed. *Common Ornamental fish diseases*. Maintenance of water quality

Note : *Italics* denotes topics for self study

References :

1. Coffey D.J., *Encyclopedia of aquarium fishes in colour*

AERO Publication 1977.

2 .Robert R.J., *Fish Pathology*

3. Jhingran U.G., *Fish and fisheries in India.* Hindustan Publication.

SEMESTER - IV

Core paper - V

ENVIRONMENTAL BIOLOGY AND ANIMAL BEHAVIOUR

Instructional Hrs.:60 **Sub.Code : 08ZOUC405**

Max. Marks :CIA -25 ;ESE- 75 **Credits : 4**

Objectives : To understand the principles and application of experimental biology and understanding animal behaviour.

UNIT – I **12Hrs.**

Abiotic factors – Light and Temperature, Animal relationship – Mutualism, *Commensalism* and Parasitism.

UNIT – II **12Hrs.**

Population – Definition – Characteristics of population.

Community – Definition – Characteristics of Community – Ecotone and Edge effect – *Ecological Niche.*

UNIT – III **12Hrs.**

Terrestrial ecology - *Grassland Biome.* Desert Biome.

Freshwater ecology – Characteristics, classification and adaptations.

UNIT – IV **12Hrs.**

Marine ecology – Characteristics, classification and adaptations.

Estuarine habitat - *Characteristics*, classification and adaptations.

UNIT – V **12Hrs.**

Approaches to behaviour study – Classification of behaviour, *Social behaviour - Honeybees,* Chronobiology, Bioluminescence and its significance in animals.

Note:*Italics* denotes topics for self study.

TEXT BOOKS

1. **Arumugam N.,** *Concepts of Ecology*, Saras Publication, Nagarcoil, 2001.

2.**Veer Bala Rastogi** , *Animal Ecology & Distribution of Animals*, Kadarnath Ramnath, Delhi, 8th Edition.

REFERENCE BOOKS

1. **Kotpal R.L and Bali NP.,** *Concepts of Ecology,* Vishal Publications, Delhi.
2. **Odum E.P**., *Basic Ecology*, Saunder's College Pub, Newyork.
3. **Ranga,** *Animal Behaviour*, Agrobios, India, 2000.
4. **Reena Mathur**, *Animal Behaviour,* Rastogi Publications, Meerut.

SEMESTER – IV

Skill Based Subject II

MULTISKILL DEVELOPMENT PAPER

Instructional Hrs : 45 **Sub Code: 13ZOUS402**

Max. Marks : 100 (ESE– 60 CIA – 40) **Credits: 3**

Aim: To equip the students with knowledge on all topics as desirable from the point of view of brilliant success in the competitive examinations.

Objective: To familiarize the students with various types of tests that are employed by the diverse examining bodies.

UNIT I **9 Hrs.**

Communication: Question tag – Gerund and Infinitives – Spotting the errors – Vocabulary – Synonyms – Antonyms - Prepositions – Articles – One word substitution – Sentence completion.

UNIT II **9 Hrs.**

Numerical Aptitude : Problems on numbers - Problems on Ages – Percentage - Profit and loss - Ratio & Proportion - Time & Work - Time & Distance - *Simple Interest* - Compound Interest.

UNIT III **9 Hrs.**

Critical Reasoning : Logical Inference Questions and Syllogism.

Analytical Reasoning : Arrangement problems – Family / Blood Relation Qualms – Sense of Directions – Age Doubts.

Verbal Reasoning : Verbal Analogy (Letter series and number series only) – Coding and Decoding.

UNIT IV **9 Hrs.**

Presentation Skills - Choosing a topic – Gathering the material – Organizing the speech- Presentation through PowerPoint – Soft Skills - *Resume Preparation* – Interview Tips and Questions.

UNIT V **9 Hrs.**

Formal project report – Acknowledgement – Review of literature – Materials and Methods – Results – Discussion – Summary – References.

Mechanical elements – Cover – Title page – Table of Content – List of Illustrations – List of symbols—Glossary.

REFERENCE BOOKS:

1. **Hari Mohan Prasad & Uma Rani Sinha. 2011.** Objective English for Competitive Examinations. New Delhi: Tata McGraw Hill Education Private Ltd. (Unit – I)
2. **Agarwal R.S.,** Quantitative Aptitude. S.Chand 2010. (Unit - II)
3. **Edgar Thorpe**, Test of Reasoning for Competitive Examinations –4th edition, Tata McGraw-Hill Publishing Company Limited, New Delhi. (Unit – III)
4. **Agarwal R.S.**, A Modern Approach to Verbal Reasoning (Fully Solved) –Revised Edition, S.Chand Company Limited, New Delhi, 2012. (Unit – III)
5. **Alex K.,** Soft Skills-Know Yourself and Know the World. S.Chand Company Ltd., 2011(Unit-IV)
6. **Kumar K.L.,** "Your Interview" S.Chand and Company Ltd., New Delhi, 2000. (Unit-IV)
7. **Gurumani N.,** Scientific Thesis writing and Paper presentation.MJP Publishers 2010. (Unit - V)

SEMESTER - III & IV

Core Practical - II

(Based on C4 & C5)

Instructional Hrs.: 60 **Sub. Code : 14ZOUCP02**

Max. Marks : CIA-40; ESE-60 **Credits : 4**

DEVELOPMENTAL BIOLOGY

Different types of eggs. (Slides & Specimen)

Embryology of Frog – Slides.

Placenta of Mammals – Sheep & man.

EVOLUTION

Study of any four fossils.

ENVIRONMENTAL BIOLOGY

Estimation of dissolved Oxygen. (Pond and River water)

Estimation of Salinity. ,,

Estimation of pH using pH paper. ,,

Estimation of free Carbon di oxide. ,,

Estimation of Carbonates. ,,

Estimation of Bicarbonates. ,,

Estimation of Calcium ,,

Study of Intertidal fauna – Rocky, Muddy and Sandy shore.

Analysis of Zooplankton in given water sample.

Study of Animal relationship – Commensalism, Mutualism and Parasitism.

Visit to Shore / Pond / Zoological park / Wild life Sanctuary / Biosphere reserves.

Field Study : Observe and identify any 15 Avian fauna.

A report must be submitted along with the record.

ANIMAL BEHAVIOUR

Social behaviour – Honey Bees

SPOTTERS:

A. Descriptive notes:

Hygrometer, Anemometer, Rain gauge, Thermometer, pH meter and D.O. Meter.

B.Draw labelled sketch :

Freshwater plankton– Nauplius larva, Cypris, Daphnia, Cyclops and Zoea larva.

C. Stages of development

Frog embryology – Egg, Sperm, 2 celled stage, 4 celled stage, Blastula and Gastrula.

D. Ecological Adaptations and Animal relationship:

Intertidal fauna –Mytilus, Balanus, Hippa, Solen, Nereis, Starfish, Sea anemone and Hermit crab – Shark and Suckerfish, Ascaris, Honeybee – Caste system.

E. Embryological / Evolutionary Importance:

Insect's egg, Hen's egg, Placenta of Sheep, Placenta of Man, Arca, Nautilus Natica and Micraster.

SEMESTER - V

Core paper - VI

CELL MOLECULAR BIOLOGY AND GENETICS

Instructional Hrs.: 75 **Sub.Code :08ZOUC506**

Max. Marks :CIA- 25; ESE-75 **Credits : 4**

Objectives : To illustrate and elucidate the basic structure and functions of cells and to explain the basic principles of heredity and mechanism of inheritance.

UNIT I **15 Hrs.**

Structure and functions of plasma membrane, Endoplasmic reticulum, Golgi bodies and *Lysosomes.*

UNIT II **15 Hrs.**

Structure and *functions of Ribosomes,* Mitochondria and Nucleus.

UNIT III **15 Hrs.**

Chromosome - Structure and Types, Nucleic acid – Structure of DNA and *RNA.*

Cell Division – Mitosis.

UNIT IV **15 Hrs.**

Mendel and his postulates – Monohybrid, Dihybrid, *Test cross*, Back cross and Laws of heredity. Multiple alleles- Blood groups and their inheritance.

UNIT V **15 Hrs.**

Linkage – Types -Linkage in Drosophila.

Crossing over – Mechanism, Theories and Significance. *Stern's experiment in Drosophila.*Mutation – Detection of mutation by CIB technique.

Chromosomal aberrations – Changes in the structure of Chromosome.

Note: *Italics* denotes topics for self study.

TEXT BOOKS

1. **Arumugam.N.**, *Cell and molecular biology,* Saras Publications, Nagarcoil.
2. **Meyyan R.P.,** *Genetics,*SarasPublications,Nagarcoil.

REFERENCE BOOKS

1. **De Robertis E.D.P. and De Robertis E.M.P.,** *Cell and molecular biology,* B.I Waverly Pvt. Ltd., New Delhi, 1998.
2. **Verma P.S. and Agarwal V.K.,** *Cytology,* S.Chand & Co., New Delhi, 1991.
3. **Verma P.S and Agarwal V.K.,** *Genetics,* S.Chand & Co., New Delhi, 2004.
4. **Winchester A.M.,** *Genetics,* Oxford, IBH Publication, 3rd Edition

SEMESTER - V

Core paper - VII

MICROBIOLOGY AND IMMUNOLOGY

Instructional Hrs.: 75 **Sub.Code :08ZOUC507**

Max. Marks : CIA-25 ; ESE-75 **Credits : 4**

Objectives : To understand the basic principles and applications of Microbiology and Immunology.

UNIT I **15 Hrs.**

General Characteristics of Bacteria – Structure, Movement, Nutrition, Respiration and Reproduction. Gram's Staining – Principle and method. Types of culture media – Batch and Continuous culture.

UNIT II **15 Hrs.**

General characteristics of Virus –Structure of Phytophage (TMV), Zoophage (HIV) and Bacteriophage (T_4). Lytic and Lysogenic cycle of T_4 phage.

General characteristics of Fungi – Morphology, Physiology and Multiplication of Yeast and Penicillium.

UNIT III **15 Hrs.**

Control of Bacteria – Sterilization by heat radiation and air filter.

Microbiology of foodborne diseases, Food poisoning, Principles of spoilage and *Food preservation.*

UNIT IV **15 Hrs.**

Innate immunity – Physical, Mechanical and *Cellular factors.* Acquired immunity – Active and Passive immunity.Cells of Immune system – Stem cells – Lymphocytes. Lymphoid organs – Primary – Thymus and bone marrow. Secondary – lymph node and spleen.

UNIT V **15 Hrs.**

Antigen – Essential factors for antigenicity and *cross reacted antigens*, Immunoglobulins – classes, properties and structure of IgG. Hyper sensitivity.

Note: *Italics* denotes topics for self study.

TEXT BOOKS

1. **Dulsy Fatima & Arumugam N**., *Immunology*, Saras publication Nagarcoil, 1996.
2. **Arumugam et.al.,** *Microbiology*, Saras publication, Nagarcoil, 1996.

REFERENCE BOOKS

1**. Dubey J.,** *Immunology*, Saras Publication, Nagarcoil.

2**. Sharma P.D.,** *Microbiology*, Rastogi publication, Meerut.

3**. Tizard I.R.,** *Immunology – An introduction*, Sounders College Publication, Philadelphia 3rd Edition.

SEMESTER - V

Core paper - VIII

BIOSTATISTICS, BIOINFORMATICS AND COMPUTER APPLICATIONS

Instructional Hrs.: 60 **Sub.Code :09ZOUC508**

Max. Marks : CIA-25; ESE-75 **Credits : 4**

Objectives : To understand the basic principles and applications of Biostatistics, Bioinformatics and Computer Applications.

UNIT I **12 Hrs.**

Data – Methods of collection – Classification and tabulation – Graphic and diagramatic representation, Arithmetic mean, median and *mode*.

UNIT II **12 Hrs.**

Standard deviation – Standard error – Students 't' test – Correlation – *types.*

UNIT III **12 Hrs.**

Introduction to computer – *Characteristics* – History – Classification – Generations – Components and functions of computers. Comparison of Hardware and Software.

UNIT IV **12 Hrs.**

Basic ideas about computer languages. Brief account on computer packages – MS Word, MS Excel and MS Power point.

UNIT V **12 Hrs.**

Bioinformatics – Definition and Scope, Biological databases – Objectives, Properties and Classification. Bioinformatic tools – Uses and Classification – BLAST. *Application of Bioinformatics.*

Note: *Italics* denotes topics for self study.

TEXT BOOKS

1.**Kumaresan V. and Sundaralingam K.,** *Bioinformatics,* Saras Publication, Nagarcoil.

2.Ramakrishnan P., *Biostatistics*, Saras Publications, Nagarcoil.

REFERENCE BOOKS

1.**Alexis Leon and Mathew Leon** – *Fundamentals of Information Technology*, Leon Tech World.

2.**Gupta S.P**., *Statistical method*s, Sultan & Sons Publications.

3.**Mani K and Vijayaraj A.,** *Bioinformatics for beginners,* Saras Publications, Nagarcoil.

4.**Mittal C.,** *Fundamentals of Information Technology,* Pragathi Prakasam, Meerut 2003.

SEMESTER - V

Core paper - IX

HUMAN GENETICS AND COUNSELLING

Instructional Hrs.: 60 **Sub.Code :10ZOUC509**

Max. Marks : CIA-25;ESE-75 **Credits : 4**

Objective : To understand the various genetic disorders in man.

UNIT I **12 Hrs**.

Human chromosome – Historical background, Location, Number, Shape, Morphology Chemistry, Classification and nomenclature. Idiogram – Banding methods (Q, C, G, R). Sex determination – Chromosomal method and Gynandromorph. *Twins and their significance in Genetics.*

UNIT II **12 Hrs**.

Autosomal dominant diseases – Polydactyle and Huntingtons chorea.

Autosomal recessive diseases – Albinism and Sickle cell anaemia, X–linked diseases – *Haemophilia and Colour blindness.*

UNIT III **12 Hrs.**

Syndromes – Down's syndrome, Turner's Syndrome and Klinefelter's Syndrome.

Dermatoglyphics – Terminology –Types of ridges - *Dermatoglyphic features of Down's syndrome.*

UNIT IV **12 Hrs.**

Genetic counselling –Definition – Aim and Procedure in Genetic counselling. *Amniocentesis* – Pedigree analysis - Definition- Uses- Recording a Pedigree chart- Pedigree patterns for polydactyle and albinism

UNIT V **12 Hrs.**

Population Genetics – Gene frequency and genotype frequency. Hardy – Weinberg principle and its application in human population. *Inbreeding and out breeding.* Future of human genetics

Note: *Italics* denotes topics for self study.

TEXT BOOK

1. **Meyyan R.P.,** *Genetics*, Saras publication, Nagarcoil, 2004.

REFERENCE BOOKS

1. **Sanjay Mandal.,** Fundementals of human genetics New Central Book Agency(p) Ltd.1996.

2. **Lynn B.Jorde**, **John c.Carey Michel J.Bamshad and Raymond L.White**., Medical Genetics Mosby Publication 1999.

2. **Gupta P.K.,** *Genetics*, Rastogi publication, Meerut, 2000.

3. **Sam Singer.,** *Human genetics*, Freeman and company, Newyork, 1985.

SEMESTER V

Core Paper X: BIOPHYSICS, BIOCHEMISTRY AND BIOINSTRUMENTATION

Instructional Hours : 60 Hrs **Code: 14ZOUC510**

Max.Marks : CIA-25;ESE-75 **Credits:4**

Objectives: To understand the basic principles of Biophysics, Biochemistry and Instruments useful for biological studies.

Unit I **12 Hrs**

Physical quantities and their units – Metric system, Conversion of units. Membrane Biophysics – Active transport, Passive transport, Diffusion, *Osmosis*, Hydrotrophy, Adsorption.

Unit II **12 Hrs**

Classification, structure and functions of Carbohydrates, Proteins and Lipids. Enzymes – Classification – Properties, chemical nature and mechanism of enzyme action – Factors affecting enzyme action – *Enzyme inhibition*.

Unit III **12 Hrs**

Water and mineral metabolism – Distribution of fluids in the body – Water metabolism – Physiological functions of water – Dehydration. Mineral metabolism – Calcium – Sodium – Potassium – Chlorine – Sulphur Trace elements - Iron – Iodine. Acid – Base regulation – Buffers – Acid-Base imbalance – *Alkalosis.*

Unit IV **12 Hrs**

Microscopy – Principles and types (*Light*, Phase contrast and Electron microscope). Centrifuge – Principle and types (Clinical and Ultra centrifuge). pH meter principles and applications. Spectrophotometer – Principles & applications.

Unit V **12 Hrs**

Chromatography – Principles, types and applications (*Paper*, Thin layer and Column). Electrophoresis – Principles & types (Paper and gel) – PAGE. Radio isotopic techniques – Radio immune assay, Biochemical applications of Radio isotopes.

Note: *Italics* denotes topics for self study.

TEXT BOOKS

1. **Narayanan L.M. et al.,** *Biochemistry,* Saras Publications, 2013.
2. **Arumugam. N. & Kumaresan.** V., *Principles and techniques of Biophysics*, Saras Publications, Nagercoil, 2015.
3. **Anne & Arumugam**, *Biochemistry and Biophysics*, Saras Publications, 2014.

REFERENCE BOOKS

1. **Powar C.B. and Chatwal. G.R.,** *Biochemistry,* Himalaya Publishing House, Delhi,2012.
2. **Ramakrishnan.S., Prasannan. K.G., and Rajan. R.,** *Text Book of Medical Biochemistry,* Orient Longman Limited, 2012.
3. **Albert. L.Lehninger, David.L.Nelson., Micheal.M.Cox,** *Principles of Biochemistry,* CBS Publishers & Distributors, Delhi, 2012.
4. **Harold Varley,** *Practical Clinical Biochemistry,* CBS Publishers, 2010.

SEMESTER – V

Skill Based Subject – III

POULTRY HUSBANDRY

Instructional Hrs. : 45 **Sub.Code: 11ZOUS503**

Max. Marks : CIA – 25 ; ESE - 75 **Credits:3**

Objectives : To prepare the students to acquire knowledge in poultry science and to give entrepreneur motivation for practicing poultry farming as cottage industry.

UNIT I **9 Hrs.**

Introduction to poultry keeping -Poultry industry in India - Breeds of poultry - Important Indian breeds -Desi - *Assel – Chittagong*. Hybrids and cross breed chickens -Plymouthrock - White leghorn – Australorp.

UNIT II **9 Hrs.**

Principles for the construction of poultry house - Deep litter house -*Cage house* - Brooder house - layer house - Broiler house.

UNIT III **9 Hrs.**

Feeds - Essential nutrients - antibiotic systems of feeding - grains and mash feeding grain - Protein concentrate mash rations - Ration of chicks - *Broiler special rations.*

UNIT IV **9 Hrs.**

Choosing commercial layer - Nutritional value of egg - Marketing of egg - By products of poultry - Hatchery - Incubation - Sexing - *Debeaking.*

UNIT V **9 Hrs**

Common diseases of poultry - Ranikhet -coryza - coccidiosis - Fowl pox. Paraslitic diseases - Large round worm - Tape worms. *Vaccination Programme.*

Note : *Italics* denotes topics for self study

References :

1. **Drogins Malden C, Nesheim, Richard. E. and Bundy.** Polutry Production (1979), Indian Edition ,K.M.Varghese company, Bombay.

2. **Morley A. Joul,** poultry breeding, john Wiley and Sons Inc. Newyork.

3. **Hytyra .F and Marck .J,** Special pathology & Therapeutics of the diseases of domestic animals.

SEMESTER - VI

Core paper - XI PHYSIOLOGY AND ENDOCRINOLOGY

Instructional Hrs.: 90 **Sub.Code : 14ZOUC611***

Max. Marks : CIA- 25; ESE-75 **Credits : 4**

Objective : To understand the various aspects of physiological activities of animals with special reference to human beings.

UNIT I **20 Hrs.**

Nutrition : Types of Nutrition, Digestion and absorption of carbohydrates, fats and proteins.

Respiration : Types of Respiration, *Respiratory pigments*, Gaseous transport and Bohr's effect

UNIT II **15 Hrs.**

Circulation : Types of heart – Neurogenic and Myogenic. Origin, Conduction and regulation of heart beat. *Blood – Composition and functions*. Blood coagulation.

Excretion : Ammonotelism,Ureotelism and Uricotelism.Mammalian nephron–Urine formation.

UNIT III **15 Hrs.**

Nerve physiology : *Types of neurons* – Initiation and conduction of nerve impulse – Synapse.

Muscle Physiology : Types of muscles, Structure of muscle, Physiology and Chemistry of Muscle contraction – Theories of muscle contraction

UNIT IV **20 Hrs.**

Endocrinology : Morphology, structure, secretions and functions of endocrine glands – Pituitary, Thyroid, Parathyroid and – *Islets of Langerhans.*

UNIT V **20 Hrs.**

Endocrinology : Morphology, structure, secretions and functions of endocrine glands – Adrenal gland, Testis and Ovary. *Placental hormones.*

Note: *Italics* denotes topics for self study.

TEXT BOOK

1.Arumugam N. and Maria Kuttikan., *Animal Physiology*, Saras Publications, Nagarcoil

REFERENCE BOOKS

1**. Dalela R.C and Verma S.R.,** *Animal Physiology and Related Biochemistry*, S.Chand & Co., New Delhi, 1995.

2. **Goel K.A and Sastry K.V.,** *Animal Physiology*, Rastogi publications, Meerut, 5th Edn.,1988-89.

3. **Prosser C.L. and Brown F.,** *Comparative Animal Physiology*,N.B.Saunders Company, 3rd Edn., 1973.

SEMESTER - VI

Core paper – XII

BIOTECHNOLOGY

Instructional Hrs.: 90 **Sub. Code : 14ZOUC612***

Max.Marks : CIA-25;ESE-75 **Credits:4**

Objectives: To understand the basic principle behind techniques involved in Bio-technology and to understanding the biodiversity of resources that could yields products useful to man.

UNIT – I **20 Hrs.**

Definitions and *Landmarks in the history of Biotechnology*. Major areas of Biotechnology. Outlines of Genetic Engineering – Restriction enzymes, Vectors, Plasmids-PBR322. Principles of PCR (Polymerase Chain Reaction).

UNIT-II **15 Hrs.**

Principles and techniques of animal cell culture – *Applications of Animal Cell culture* Protoplast fusion – Methods and uses. Blotting techniques.Gene cloning in Eukaryotes.

UNIT-III **20 Hrs.**

Transgenic technology – Transgenic Mice. Monoclonal antibodies – production and applications. Health care products – Production of Insulin and *Vaccines.*

UNIT – IV **15 Hrs.**

Biogas production. Bio-fertilizer (Rhizobium). Biopesticides (Bacterial pesticides). Production of Single Cell Protein – Spirulina and *Mushroom culture.*

UNIT-V **20 Hrs.**

Sewage management. Fermenter design and types. Enzyme extraction and purification – *Industrial application of enzymes*. Immobilization of enzymes and its application. Cryobiology – Methods of cryopreservation.

Note: *Italics* denotes topics for self study.

TEXT BOOK

1.**Kumaresan V.,** *Biotechnology,* Saras Publication, Nagercoil, 2005.

REFERENCE BOOKS

1.**Dubey R.C.,** *Biotechnology* ,PG Publishing Pvt.Ltd., New Delhi,1994.

2.**Jogdand S.N.,** *Environmental Biotechnology,* Himalaya Publishing House, Bombay, 1995.

3.**Freshney R .I**.,*Culture of Animal cells*, Wikyliss Publication ,2000.

SEMESTER -VI

Elective – I

DAIRY SCIENCE

Instructional Hrs.: 60 **Sub. Code : 08ZOUE601**

Max.Marks : CIA- 25; ESE-75 **Credits:4**

Objectives: To create white revolution and employment opportunity.

UNIT – I **12 Hrs.**

Dairy farming – Definition – Scope.

Dairy breeds of India and its classification.

Exotic cow breeds – Jersy and Red Sindhi. Buffalo- Murrah and Surti.

Goat – Jamunapari and *Malapari.*

UNIT-II **12 Hrs.**

Common cattle feed and their nutritive values.

Rations – its computation and qualities – *Balanced ration*.

Anatomy and physiology of mammary glands.

Milk secretion and importance of Colostrum.

UNIT-III **12 Hrs.**

Milk composition – Nutritive value.

Pasteurization of milk – spoilage of milk.

Milk products: Butter, Cream, Cheese, *Khoa and Ghee*. Adultration of milk.

UNIT – IV **12 Hrs.**

Viral Diseases – Cow pox – Foot and mouth disease – Rinder pest

Bacterial diseases – Anthrax – Mastitis – Tuberculosis – Haemorrhagic septicemia.

Non-contagious diseases – Milk fever. Parasites of dairy breeds.

UNIT-V **12 Hrs.**

Role of Co-operative societies in milk production and marketing.

Techniques adopted in cattle breeding – Inbreeding, Outbreeding and Artificial Insemination. *Merits and Demerits of Dairy business.*

Note: *Italics* denotes topics for self study.

REFERENCE BOOKS

1. **Banerjee C.**, *A text book of Animal Husbandry*, Oxford & IBH publication, New Delhi.
2. **Raj M.M.,** *Dairy Chemistry and Animal Nutrition*, Kalrant publishers, 1985.
3. **Schmidt G.H. and Van Vleck T.D.,** *Principles of Dairy Sci*ence, Surgeet Pvt.Ltd., 1982.

SEMESTER – VI

Elective – II

VERMICULTURE

Instructional Hrs.: 60 **Sub.Code:O8ZOUE602**

Max.Marks:CIA-25;ESE-75 **Credits : 4**

Objectives : To train and impart knowledge of earthworm, their culture practices,ecological and economic importance – maintenance and management of vermifarms.

UNIT –I **12Hrs.**

Classification of earthworms–Morphological, Anatomical and *Life History of composting Earthworms (Eudrilus eugeniae).* Ecological groups of earthworm – epigic, endogic and anecic.

UNIT –II **12Hrs.**

Soil fertility and texure – Soil aeration and water impercolation – *Earthworm burrows* – Soil organic matter – Organic matter decomposition, humus formation.

UNIT –III **12Hrs.**

Selection of suitable species. Preparation of vermibed–pit and heap or windrow methods. Vermi composting – Definition – requirements and preparation for vermi composting.

UNIT –IV **12Hrs.**

Factors affecting vermicomposting. *Feed for earthworms*. Earthworm predators and parasites. Harvesting of compost.

UNIT –V **12Hrs.**

Vermi wash production techniques and its application. Vermi composting schemes. Marketing of vermicompost. *Advantages of Vermitechnology*. Application of vermicomposting in agriculture and horticulture practices.

Note: *Italics* denotes topics for self study.

REFERENCE BOOK

1.**Arvind Kumar**, *Verms and Vermitechnology,* Environmental Science Research unit, APH Publications, New Delhi, 2005.

2.**Bathagar R.K. & Patla R.K.,** *Earthworm Vermiculture and Vermicomposting,*

Kalyani publishers, Madras, 2003.

3.**Gupta.P.K.,** *Vermicomposting for sustainable Agriculture*, Agrobios, India, 2004

SEMESTER-VI

PART IV – Skill Based Subject – IV

SERICULTURE

Instructional hrs: 45 **Subject code :11ZOUS604**

Max.Marks : CIA-25;ESE-75 **Credits : 3**

Objectives: To prepare the students to acquire adequate knowledge in Sericulture and to be a self employed youth

UNIT I **9 Hrs.**

History and economic importance of Sericulture. Types of Silk Worms - mulberry and Non-mulberry (Tasar, Eri and Muga). *Silk industry in India*.

UNIT II **9 Hrs.**

Moriculture – *methods of propagation*, methods of irrigation, Pruning and harvesting

UNIT III **9Hrs.**

Rearing equipments – Rearing stand – Rearing trays – Chop stick – Feather – Leaf basket – Leaf chamber – Chopping Knife – Feeding stand – cleaning net and mountages. Seed production (Grainage). *Feeding of silk worm*.

UNIT IV **9 Hrs.**

Mounting, Process of spinning and harvesting. Cocoons – Physical and Chemical characteristics. *Defective Cocoons*. Diseases of Silkworm – Pebrine, Flacherie and Grasserie.

UNIT V **9 Hrs.**

Stiffing, Process of reeling, Finishing, Testing and Marketing. *By products of silk reeling*.

TEXT BOOK:

Ganga.G & Sulochana Shetty.J. – *An Introduction to Sericulture*.OXFORD & IBH Publications,Co.PVT.New Delhi.

REFERENCE BOOKS:

1. Arumugam N. -*Applied Zoology* – Saras Publications.
2. Shukla.G.S. & Upadhyay.V.B.- *Economic Zoology*, Rastogi publications,Meerut.
3. Ravindranathan.K.R. –*A Text book of Economic Zoology*,Dominant publications, New Delhi.

SEMESTER – V & VI

Core practical - III

(Based on C_6, C_7 C_8 & C_9)

Instructional Hrs.: 60 hrs. **Sub. Code : 14ZOUCP03**

Max. Marks :CIA- 40; ESE-60 **Credits : 4**

CELL MOLECULAR BIOLOGY

Squash preparation of onion root tip to show Mitosis.

Identification of Salivary gland chromosomes in Chironomous Larva (Demonstration only)

GENETICS

Culture of Drosophila.

Drosophila sex identification.

Identification of Mutant forms.

Survey of Mendelian traits in human population.

Variation in finger prints.

Identification of barr body.

MICROBIOLOGY

Sterilization methods - Autoclave – Hot air oven.

Serial dilution technique for soil samples.

Preparation of culture media for bacteria -Nutrient broth and nutrient agar.

Determination of texture, pH and temperature in soil samples.(Red soil, Loamy soil, Clay soil)

Perform hanging drop mount method to examine the motility of bacteria.

Differential staining of given culture to identify gram positive and gram negative bacteria.

IMMUNOLOGY

Preparation of blood smear.

Leucocyte – differential count.

Lymphoid organs – Thymus, Spleen.

BIOSTATISTICS AND COMPUTER

Find out arithmetic mean, median and mode for biological data.

Find out standard deviation for biological data.

Study of computer components.

SPOTTERS:

A. Comment on the stage of cell division/cell organelles

Stages of Mitosis – Prophase, Metaphase, Anaphase and Telophase.

Cell organelles – Mitochondria, Endoplasmic reticulum, Nucleus.

B. Genetic Importance

Drosophila- Normal – male and female, Mutant – Bar eye, Vestigeal wing, Polytene chromosome and Lamp brush chromosome.

C. Microbiological Significance

Vibriocholerae, Lactobacilli, HIV, Bacterio phage, Yeast, Mushroom, Pencillium.

D. Immunological Significance

Thymus, Spleen,Vaccine - BCG, TAB, DPT, Hepatitis B.

E. Descriptive Notes

Autoclave, Hot air oven,Nutrient agar medium,Inoculation needle, Culture late,Colony counter.

Computer Components - Key board, Mouse, CPU and Monitor.

SEMESTER – V& VI

Core Practical – IV

(Based on C_{10}, C_{11} & C_{12})

Instructional Hrs : 90 **Sub.Code : 14ZOUCPO4**

Max. Marks : CIA – 40; ESE – 60 **Credits: 4**

BIOCHEMISTRY

Biochemical detection of Carbohydrate, Proteins and Lipids.

Gel electrophoresis (Demonstration only)

Separation of aminoacids by paper chromatography

PHYSIOLOGY

Qualitative detection of excretory products.

Qualitative detection of Albumin, Urea and sugar in urine sample.

Total count of RBC

Total count of WBC.

Demonstration of blood pressure in man.

BIOTECHNOLOGY

Blotting techniques – Observation of photographs.

Isolation of human DNA from buccal cavity.

Immobilization of cells

Visit to Biotechnology Industry / Laboratory – A report to be submitted along with the record.

SPOTTERS

A. Comment on

Brain, Lung, Heart, Liver, Kidney**.**

B. Histology of endocrine glands

Pituitary, Thyroid, Adrenal, Testis, Ovary

C. Draw labeled sketch

Striated muscle, Non-striated muscle,Cardiac muscle, Neuron, Human blood.

D. Descriptive notes

Stethoscope, Sphygmomanometer, Southern blotting, Western blotting, Paper chromatography, Gel electrophoresis,Spectophotometer,Laminar air flow.

E. Biotechnological significance

E.coli, Recombinant pBR 322 plasmid, Insulin, Spirulina, Biofertilizer – Rhizobium and

Biopesticide – Bacillus thuringiensis, Bio reactor.

SEMESTER - VI

ELECTIVE PRACTICAL

(Based on Elective Papers I & II)

Instructional Hrs : 30 **Sub.Code :11ZOUEP01**

Max. Marks : CIA- 40; ESE-60 **Credits : 3**

VERMICULTURE

1) Earthworm-Digestive system, Reproductive system, Body setae, Pineal setae, Ovary and Spermatheca (Through charts / Digital materials)
2) Classification of earthworm
3) Composting species
4) Vermicomposting materials
5) Preparation of Pit and Heap methods for vermicomposting. (Demonstration only).
6) Identification of earthworm cocoons and vermicasts
7) Preparation of vermiwash. (Demonstration only).

DAIRY SCIENCE

8) Testing the quality of Raw and Pasteurized milk samples by
   (i) MBR test (ii) Clot on oiling test
   (iii) Alcohol test (iv) Turbidity test.
9) Determination of pH of milk samples.
10) Analysis of specific gravity of milk using Lactometer.
11) Quantitative detection of fat in milk using Butyrometer.
12) Detection of Adulterants-Cane sugar, Starch and Chloride.
13) Detection of Preservatives-Formalin and Urea.
14) Identification of milk products-Curd, Butter, Ghee and Khoa.
15) Identification of milk breeds- Jersey, Red Sindhi, Murrah and Jamunapari.
16) Cattle diseases-Anthrax, Rinderpest, Mastitis, Septicemia.

Visit to Vermifarm and Dairy Farm-A report to be submitted along with the record.

SEMESTER – I

ALLIED ZOOLOGY- PAPER - IINVERTEBRATA AND CHORDATA

Instructional Hrs: 60 **Sub.Code:16ZOUA101**
Max. Marks: CIA-20; ESE-55 **Credits: 4**

Objective: To acquire a basic knowledge of animal structure and its organization.

UNIT I **8 Hrs**

General Characteristics of Phylum Protozoa, Porifera and Coelenterata

Type Study : **Paramecium caudatum** - External features - Nutrition – Locomotion - Reproduction - Asexual - Binary fission, Sexual reproduction - Conjugation, Autogamy, Endomixes, Hemimixes and *Cytogamy.*

UNIT II **12 Hrs**

General Characteristics of Phylum Platyhelminthes, Aschelminthes, Annelida and Arthropoda.

Type Study : **Periplaneta americana** (Cockroach) -*External features* - Body wall - Body cavity - Mouth parts - Digestive system - Blood vascular system - Respiratory system - Excretory system – Nervous system - Reproductive system.

UNIT III **10 Hrs**

General Characteristics of Phylum Mollusca and Echinodermata

Type Study : **Asterias rubens** (Starfish) - External features - Pedicellaria structure and function - Digestive system - Respiratory system - Water vascular system - structure and function- Circulatory system - Excretory system - Reproductive system - *Life cycle*.

UNIT IV **15 Hrs**

General Characteristics of Class Pisces, Amphibia and Reptilia

Type Study : **Scoliodon sorrakowah** (Shark) (Excluding Endoskeleton)- External features - Digestive system - Respiratory system – Circulatory system - Nervous system - Urinogenital system.

UNIT V **15Hrs**

General Characteristics of Class Aves and Mammals

Type Study : **Rana hexadactyla** (Frog) (Excluding endoskeleton)- External features - Sexual dimorphism - Locomotion- Digestive system- Respiratory system- Circulatory system- Nervous system- Urinogenital system - *Life cycle*.

Note: Italics denotes topics for self study.

TEXT BOOKS

1.**Thangamani et.al.,***A Text book of Invertebrates,* Saras Publication, Nagercoil, 2014.

2. **Thangamani et.al.,** *A Text book of Chordates,* Saras Publications, Nagercoil, 2014.

REFERENCE BOOKS

1. **Ekambaranath Ayyar and Anantha Krishnan T.N**., *A Manual of Zoology* Vol I Part I & II. S.Viswanathan Pvt.Ltd., Chennai, 1992.

2. **Jordan E.L and Verma P.S**., *Chordata zoology,* Chand & co, New Delhi,2000.

3. **Kotpal et.al**., *A Modern text book of Zoology*, Rastogi Publication, Meerut, India, 1989.

SEMESTER - II
Allied Zoology Paper - II
APPLIED ZOOLOGY

Instructional Hrs: 60 **Sub.Code:16ZOUA202**
Max.Marks. CIA-20; ESE - 55 **Credits: 4**

Objectives : To acquire adequate knowledge in applied fields of Zoology

UNIT I

AQUACULTURE

Definition - Scope - Types of Aquaculture - Freshwater Aquaculture - Pond, Dam & Lake, Brackishwater Aquaculture - Marine aquaculture - Coastal & Off shore Aquaculture, Management of Fish farms. Culturable organism - Fin fishes. Feed organisms - Algae and Seaweeds. Integrated fish farming - Paddy cum fish culture. Preservation of Fishes - Methods of Preservation.

UNIT II

SERICULTURE

Definition - Scope - History of Sericulture - Types of Silkworm - Tasar, Muga, Eri. Life cycle of Mulberry Silkworm *Bombyx mori*. Rearing Appliances - Rearing stand, Rearing tray, Ant wells, Paraffin paper, Foam rubber strips, Chop sticks, feather. Feeding Appliances - Leaf basket, Leaf chamber, Chopping board, Chopping knife, Mats, Feeding stand. Mountage - Chandrika.

UNIT III

VERMITECHNOLOGY

Definition - Scope - Ecological Classification of Earthworm - Epigeic, Endogeic and Anecic. Life history of Composting Earthworm - *Eudrilus eugeniae*. Methods of Vermicomposting - Pit method and Heap method. Advantages of Vermitechnology - Vermiwash and its Applications.

UNIT IV

APICULTURE

Definition - Scope - Choice of Bee in Apiculture - Desirable traits, Good choice, Poor choice, Best Choice. Kinds of Honey Bee - *Apis dorsata, A.florea, A. cerana indica*. Development of Honey Bee - Egg, Larva, Pupa and Adult. Bee keeping - Modern bee keeping - Newton Hive. Bee comb - Storage cells, Brood cells, Queen cells, Drone cells, Worker cells. Honey Extraction. Honey - Properties - Chemical composition - Nutritional value - Medicinal value - Honey as food - Bee venom - Bees wax.

UNIT V

HAEMATOLOGY

Blood - Components and functions - Collection of blood - Human blood groups - ABO grouping, Rh system, Determination of bleeding time - clotting time, Haemoglobin estimation by Sahli's method.

REFERENCE BOOKS

1. **Dr.N.Arumugam,** *Aquaculture,* Saras Publication, 2009.

2. **Ganga.G & Sulochana Chetty. J.,** *An Introduction to Sericulture,*Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 2010.

3. **Bhatnagar & R.K Palta.,** *Earthworm- Vermiculture and Vermicomposting*, Kalyani publishers, Chennai, 2006

4. **Ranganathan L.S.,***Vermibiotechnology from soil health to human health*, Agrobios (India), 2006.

5. **K.V.Jayashree, Tharadevi C.S., Arumugam.N.,** *Apiculture,* Saras Publication, 2014.

6. **Mukherjee. K.L.,** *Medical Laboratory Technology*, Vol. I, Tata Mc Graw Hill Publishing Ltd., New Delhi, 2004.

SEMESTER I & II
ALLIED ZOOLOGY PRACTICALS
[Based on Papers I & II]

Instructional Hrs: 90 **Sub.Code: 16ZOUAP01**
Max.Marks : CIA - 20; ESE - 30 **Credits: 4**

LABORATORY EXERCISES:

1. **COCKROACH** - Mouth parts, Salivary glands, Digestive system, Nervous system, Male and Female Reproductive system (Through charts)
2. **FROG** - Digestive system, Arterial system, Venous system,

   Male and Female Urinogenital system (Virtual Dissection)

MOUNTINGS:

3. **EARTHWORM** - Body setae

EXPERIMENTS:

4. Blood grouping- ABO and Rh system.
5. Determination of bleeding time.
6. Determination of clotting time.
7. Haemoglobin estimation by Sahli's method

SPOTTERS:

Identify and comment on:

Paramecium, Earthworm, Cockroach, Starfish, Shark, Placoid Scale,Frog, Earthworm - Body setae, Penial setae, Vermicompost, Haemoglobinometer, Antisera A, B and D, Chandrika, Silk gland, Silkworm cocoon, *Catla catla*, *Tilapia mossambicus*, *Penaeus indicus*, Honey bee - Queen, Drones, Workers, Honey, Bee hive, Newton Bee hive.

SEMESTER - III

Non-major – Elective - I

WILD LIFE MANAGEMENT

Instructional Hrs.: 30 **Sub.Code :09ZOUN301**

Max. Marks : ESE-100 **Credits : 2**

Objectives : To acquire basic knowledge of wild life, to understand the wild life fauna and to admire and conserve it.

UNIT I **6 Hrs.**

Wild life management – Definition and Aim. *Wild life of India*. Ecological sub divisions – Himalayan mountain system – Peninsular – Indian subregion and Tropical evergreen forests.

UNIT II **6 Hrs.**

Wild life values and benefits. Causes of Wild life depletion – Necessity for conservation – Modes of conservation.

UNIT III **6 Hrs.**

Account of Sancturies and National parks in India. Wild life census techniques.

UNIT IV **6 Hrs.**

Indian endangered fauna, Special projects for endangered species – Project Tiger, Gir Lion Project, Crocodile breeding project and Project elephant.

UNIT V **6 Hrs.**

Indian Board of Wild life (IBWL). Biosphere reserves – Nilgiri Biosphere Reserve (NBR) *Wild life (Protection) Act.*

***Note :Italics* denotes topics for self study.**

REFERENCE BOOKS

1**. Saharia V.B.,** *Wildlife in India,* Nataraj Publications, Dehradun.

2.**Veer Bala Rastogi & Jayaraj.,** *Animal Ecology & distribution of animals*, Kedarnath Ramnath, Delhi.8th Edition.

3.**Verma P.S. & Agarwal V.K.,** *Environmental Biology,* Rastogi Publication, Meerut,2001.

SEMESTER - IV

Non-Major – Elective - II

PUBLIC HEALTH & HYGIENE

Instructional Hrs.:30 **Sub.Code :09ZOUN402**

Max. Marks : ESE- 100 **Credits : 2**

Objectives : To create awareness about the significance of personal hygiene and protection of individual health from various diseases.

UNIT I **6 Hrs.**

Scope of Public Health and Hygiene – Concepts of health and disease – Nutrition and health.Nutritional deficiency – Kwashiorkar, *Anaemia* and Scurvy, Oral Rehydration Therapy.

UNIT II **6 Hrs.**

Communicable diseases – Cholera, Typhoid, *Malaria,* Amoebiasis and Measles.

UNIT III **6 Hrs.**

Non-Communicable diseases – Hypertension, Stroke, *Diabetes* and Obesity.

UNIT IV **6 Hrs.**

Occupational health hazards – Physical, Chemical, Mechanical and Psychological. *Alcoholism.*

UNIT V **6 Hrs.**

Health planning in India – Health programmes in India – *WHO* – Non-Governmental voluntary health organisations.

Note: *Italics* denotes topics for self study.

REFERENCE BOOKS

1.Deb A.C., *Fundamentals of Biochemistry,* New Central book agency Ltd., Calcutta, 8th Edition, 2002.

2. **Park and Park.,** *Text book of Preventive and Social Medicine,* M/s. Banarsidas Bhanot Publishers, Jabalpur, 1995.

3. **Verma S.,** *Medical Zoology,* Rastogi Publications, Meerut, 1998.

SELF- LEARNING PAPER

APICULTURE

Max.Marks: ESE - 100 **Sub.Code: 13ZOUSLO4**

Credits: 5

Objective : To motivate the students for practicing apiculture as agrobased cottage industry.

UNIT I

Introduction – Scope – Honeybee classification – Types of honeybees – Social organization of honeybee colony.

UNIT II

Life history of honeybee – Selection of bees for culture. Flora for apiculture. Bee hive.

UNIT III

Methods of bee keeping – Indigenous method – Extraction of honey.Modern method of apiculture - Appliances for modern method - Advantages of modern method.

UNIT IV

Products of bee keeping – Honey – Production – Chemical composition – Storage. Bee wax- Chemical composition. Economic importance of Honey, Bee wax and Bee venom.

UNIT V

Diseases of honeybee and control measures. Enemies of honeybee. Bee keeping industry – Recent efforts.

REFERENCE BOOKS

1.Arumugam N., et al., *Applied Zoology*, Saras Publications, Nagarcoil, 2009.

2.Shukla G.S & Upadhyay V.B., *Economic Zoology*, Rastogi Publications, Meerut,2005.

3.Ravindranathan K.R., *A Text book of Economic Zoology*, Dominant Publishers, New Delhi, 2005.

QUESTION PAPER PATTERN FOR CORE AND ELECTIVE PAPERS IN ZOOLOGY

Duration : 3 hours Max.Marks : 75

ANSWER ALL QUESTIONS

DRAW DIAGRAMS WHEREVER NECESSARY

SECTION - A (10x1=10 Marks)

10 Questions (Two questions from each unit) (Multiple choice questions)

Each question carries one mark.

SECTION - B (5x5=25 Marks)

5 Questions (one question from each unit) with internal choice

Answer the following questions, each answer not exceeding 250 words

Each question carries 5 marks.

SECTION - C (5x8=40 Marks)

8 Questions (Open choice) 1 Question from each unit, subject to a maximum of two.

Answer any Five questions, each answer not exceeding 1000 words

Each question carries 8 marks.

QUESTION PAPER PATTERN FOR NON-MAJOR ELECTIVE & SELF STUDY PAPERS IN ZOOLOGY

Duration : 3hours Max.Marks.100

8 Questions (OpenChoice). 1 Question from each unit, subject to a maximum of two

Answer any Five Questions. Each Question carries 20 Marks.

QUESTION PAPER PATTERN-SKILL BASED SUBJECTS IN ZOOLOGY

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

8 Questions (Open Choice) 1 Question from each unit, subject to a maximum of Two.
Answer any Five Questions. Each Question carries 15 Marks.

QUESTION PAPER PATTERN FOR CORE AND ELECTIVE PRACTICALS

Duration : 3hours	**Max .Marks :60**
Q.1. Major experiment/ Flag labelling	**-20Marks**
Q.2. Minor experiment/ Flag labelling	**-10 Marks**
Q.3. Spotters A,B,C,D&E. Identification and notes (5X4)	**-20 Marks**
Record	**-10 Marks**
	.....
	60 Marks
	.....

QUESTION PAPER PATTERN FOR ALLIED ZOOLOGY PRACTICAL

Duration :3 hours	**Max.Marks :30**
Q.1. Major experiment/ Flag labelling	**-10 Marks**
Q.2. Minor experiment/ Flag labelling	**- 5 Marks**
Q.3. Spotters A,B,C,D,&E. Identification and notes (5X2)	**-10 Marks**
Record	**- 5 Marks**
	.....
	30 Marks
	.....

CONTINUOUS INTERNAL ASSESSMENT AND EVALUATION TECHNIQUES

COMMON TO CORE, ELECTIVE AND SKILL BASED SUBJECTS

INTERNAL ASSESSMENT : 25 Marks

Q.1. First Continuous Assessment Test - 10

Q.2. Second Continuous Assessment Test

Q.3. Model Examination - 10

Q.4. Assignment /Seminar - 5

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25 Marks

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ALLIED ZOOLOGY PAPERS

INTERNAL ASSESMENT: 20Marks

Q.1. First Continuous Assessment Test -8

Q.2. Second Continuous Assessment Test

Q.3. Model Examination -8

Q.4. Assignment /Seminar -4

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20 Marks

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VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS), ERODE - 12.

CONTINUOUS INTERNAL ASSESSMENT FOR PRACTICALS IN ZOOLOGY

COMMON TO COREAND ELECTIVE PRACTICALS

INTERNAL ASSESSMENT: 40 Marks

Lab work	**-**	**20**
Test	**-**	**15**
Record work	**-**	**5**
		40 Marks

ALLIED PRACTCALS

INTERNAL ASSESSMENT : 20 Marks

Lab work	**-**	**10**
Test	**-**	**8**
Record work	**-**	**2**
		20 Marks