HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.) [Re-Accredited with "A" Grade by NAAC, Bangalore]

Uthamapalayam - 625 533



DEPARTMENT OF ZOOLOGY

Bachelor of Science - Zoology Syllabus

(Academic Year 2017 – 2018 Onwards)

PROGRAMME SPECIFIC OUTCOMES:

- **PSO1**.Identify the major groups of organisms with an emphasis on animals and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics of animals that differentiate them from other forms of life.
- **PSO2.** Understand the basic concepts in cell and its components which are used to generate and utilize energy besides the development of various animals.
- **PSO3**. Competence in distinguishing the anatomy of various animals and understand the physiological process.
- **PSO4**. Explicate the ecological interconnectedness of life on earth by tracing energy and nutrient flows through the environment.
- **PSO5.**Ability to apply fundamental statistical tools and physical principles (physics, chemistry) to the analysis of relevant biological situations.
- **PSO6.** Synthesis of information from the biological literature and communicate effectively in writing.

HAJEE KARUTHA ROWTHER HOWDIA COLLEGE (AUTONOMOUS) UTHAMAPALAYAM -625 533.

B.Sc., Zoology (Choice Based Credit System) Programme Scheme, Scheme of Examinations & Syllabus (Academic Year 2017 – 2018 onwards)

Eligibility: A pass in +2 examination conducted by the Board of Higher Secondary Education, Government of Tamil Nadu with Mathematics as one of the subject OR any other examination accepted by the Syndicate as equivalent.

Duration of the Course: The students who are joining the degree shall undergo a study period of Threeacademic years- Six Semesters.

Subjects of study:

Medium of instruction: English

Part – I - Tamil / Arabic / Malayalam Part –II – English Part –III – 1.Core Subjects - Zoology 2.Allied Subject –Chemistry/Botany 3. Elective Part –IV - 1.Non-Major Elective subject 2.Skill Based Subjects 3.Environmental Studies 4.Value Education Part- V- Extension Activities

Evaluation:

Theory:Internal – 25 marks Practical: Internal – 40 marks External – 75 marksExternal – 60 marks Total– 100 marks Total – 100 marks

Internal Examination: 25 Marks

- 1. Two Tests to be conducted 20 marks (average of 2 tests to be taken).
- 2. Seminar / Assignment / Quiz 5 marks.
- 3. Third Test may be allowed for absentees of any one of the two tests.

External Examination: 75 Marks

The pattern of External Examination Question Paper for Part I, Part III and IV will be as follows:

Time: 3 hours Maximum Marks:75

Section – A (10 X 1 = 10 Marks) Question numbers 1 to 10 - Answer all questions. (multiple choice). Two questions from each unit. Fourchoices in each question.

Section – B ($5 \times 7 = 35$ Marks) Question numbers 11to 15. Answer all questions choosing either A or B. One question from each unit.

> 11 A or 11 B 12 A or 12 B 13 A or 13 B 14 A or 14 B 15 A or 15 B

Section – C ($3 \times 10 = 30$ Marks) Question numbers 16 to 20. Answer any three out of five. One question from each unit.

The pattern of External Examination Question Paper for **Part II** will be as follows : **Section – A:** Prose 16 Marks. **Section – B:** Poetry 11 Marks. **Section – C:** Short Story 13 Marks. **Section – D:** Grammar 19 Marks. **Section – E:** Composition 16 Marks.

The pattern of External Examination Question Paper for **Part IV Environmental Studies and Value Education** will be as follows :

Section – A: ($5 \times 6 = 30$ Marks) Question numbers 1 to 5 – Answer all questions choosing either (a) or (b). One question from each unit. Descriptive Type – 100 words each.

Section – B ($3 \times 15 = 45$ Marks) Question numbers 6 to 10. Answer any three out of five. One question from each unit. Descriptive and Analytical Type – 250 words each.

Eligibility for the degree: A candidate shall be declared as passed the program if he/she scored a minimum of 40% of total marks (internal and External) in each course. Minimum required marks in external is 27.

	Hajee Karutha Rowther Howdia College (Autonomous)								
	B.sc, Zoology- Programme Content & Syllabus (2017-2018 onwards)								
Sem	Part	Course category	Course code	Title of the course	Credits	Hours	Int. Marks	Ext. Marks	Total Marks
	I Language 17UTAL11/ 17UARL11/ 17UMLL11 Tamil / Arabic / Malayalam II Language 17UENL11 English for Enrichment – I Core 17UZYC11 Core Subject – I- INVERTEBRATA		3	6	25	75	100		
			English for Enrichment – I	3	6	25	75	100	
			Core Subject– I- INVERTEBRATA	5	6	25	75	100	
	III Ali	Core practical	17UZYC2P	Core Paper III practical-I; Invertebrata & Chordata (No exam in this semester)	-	2	40	60	100
Ι		Allied	17UCHA11	Allied Subject-I- Paper-I- Chemistry	4	4	25	75	100
		Allied Practical	17UCHA2P	Allied Subject-I Practical-I- Volumetric Analysis (No exam in this Semester)	-	2	40	60	100
		SBS	17UZYS11	Skill Based Subject – I FISHERIES BIOLOGY	2	2	25	75	100
	IV	NME	17UZYN11	NonMajor Elective – 1 COMMERCIAL ZOOLOGY	2	2	25	75	100
				Total	19	30	230	570	800

Sem	Part	Course Category	Course Code	Title of the course	Credits	Hours	Int. Marks	Ext. Marks	Total Marks
	Ι	Language- I	17UTAL21/ 17UARL21/ 17UMLL21	Tamil /Arabic/Malayalam	3	6	25	75	100
	II	Language- II	17UENL21	English -II	3	6	25	75	100
		Core	17UZYC21	Core Subject- II- CHORDATA	3	6	25	75	100
п	III	Core	17UZYC2P	Core Subject III Practical-I INVERTEBRATA & CHORDATA	5	2	40	60	100
		Allied	17UCHA21	Allied Subject – I paper II Chemistry II	4	4	25	75	100
		Allied Practical	17UCHA2P	Allied Subject I Practical-1 Volumetric Analysis	1	2	40	60	100
	IV	SBS	17UZYS21	Skill Based Subject- 2 POULTRY SCIENCE	2	2	25	75	100
	IV	NME	17UZYN21	Non Major Elective – II ORNAMENTAL FISH CULTURE	2	2	25	75	100
				Total	24	30	230	570	800

Se m	Part	Course Category	Course Code	Title of the course	Credits	Hours	Int. Marks	Ext. Mark s	Total Marks
	Ι	Language I	17UTAL31/ 17UARL31/ 17UMLL31	Tamil / Arabic/Malayalam	3	6	25	75	100
	II	Language II	17UENL31	English for Enrichment – III	3	6	25	75	100
		Core	17UZYC31	Core Subject – IV CELL & MOLECULAR BIOLOGY	4	4	25	75	100
		Core	17UZYC4P	Core Subject VI Practical-II ; CELL & MOLECULAR BIOLOGY&DEVELOPMENT BIOLOGY (No exam in this semester)	-	2	40	60	100
		Allied	17UCHA31	Allied Subject I - Paper III Chemistry	4	4	25	75	100
ш	ш	Allied	17UCHA4P	Allied Subject I – Practical- II- Organic Analysis (No exam in this semester) Analysis	-	2	40	60	100
		Allied	17UBYA11	Allied Subject – II - Paper I Botany- Algae,Fungi,Bryophytes, Pteridophytes and Gymnosperms	4	4	25	75	100
		Allied 17UBYA2P	Allied Subject II – Practical IAlgae,Fungi,Bryophytes, Pteridophytes, Gymnosperms, Anatomy, Pathology, Genetics, Plant Breeding and Evolution (No exam in this semester)	-	2	40	60	100	
	1	Total	1	L	18	30	245	555	800

Sem	Part	Course Category	Code	Title of the course	Credits	Hours	Int. Marks	Ext. Marks	Total Marks
	Ι	Language I	17UTAL14/ 17UARL14/ 17UMLL14	Tamil / Arabic/Malayalam	3	6	25	75	100
	II	Language II	17UENL14	English for Enrichment – IV	3	6	25	75	100
		Core	17UZYC41	Core Subject –V DEVELOPMENTAL BIOLOGY	4	4	25	75	100
		Core	17UZYC4P	Core Subject VI Practical-II- CELL & MOLECULAR BIOLOGY & DEVELOPMENTAL BIOLOGY	4	2	40	60	100
		Allied 17UCHA4	17UCHA41	Allied Subject I - Paper IV CHEMISTRY-IV	4	4	25	75	100
IV		Allied Practical	17UCHA4P	Allied Subject I– Practical II; ORGANIC ANALYSIS	1	2	40	60	100
	III	Allied	17UBYA21	Allied Subject – II - Paper II Botany- Microbiology and pathology, Anatomy, Genetics, Plant Breeding and Evolution	4	4	25	75	100
		Allied Practical 17UBYA2P		Allied Subject II – Practical IAlgae,Fungi,Bryophytes, Pteridophytes, Gymnosperms, Anatomy, Pathology, Genetics, Plant Breeding and Evolution	1	2	40	60	100
	V		17UEAC61	Extension Activities	-	2	-	25	75
		Total			24	30	245	555	900

Sem	Part	Course Category	Code	Title of the course	Credits	Hours	Int. Marks	Ext. Marks	Total Marks
		Core	17UZYC51	Core subject – vii Ecology& Evolution	5	5	25	75	100
		Core	17UZYC52	Core subject–viiiGenetics &Biostatistics	5	5	25	75	100
		Elective	17UZYE51	Elective-I-Microbiology					100
		Elective	17UZYE52	Elective-II-Computer Application & Information Technology	5	5	25	75	100
		Core	17UZYC6P	Core Subject X Practical-3 Biochemistry , Ecology Genetics, Biostatistics Molecular biology(No exam in this semester)	-	2	40	60	100
	III	Core	17UZYC6Q	Core Subject XI Practical-4- Microbiology, Physiology, Biotechnology & Evolution(No exam in this semester)	-	2	40	60	100
V		Allied	17UBYA31	Allied Subject – II - paper III Botany- Taxonomy of angiosperms, Economic Botany,Embryology, Horticulture and Medicinal Plants	4	4	25	75	100
		Allied Practical 17UBYA4P		Allied Subject II – practical II Taxonomy of angiosperms, Embryology, Horticulture, Medicinal Plants, Economic Botany, Plant Physiology, forestry, applied Botany, Environmental Biology and Biodiversity(No exam in this semester)	-	2	40	60	100
	137	SBS	17UZYS51	Skill based Subject-III IMMUNOLOGY	2	3	25	75	100
	1	EVS	17UEVS51	Environmental Studies	2	2	25	75	100
	·	Total		·	23	30	325	575	900

Sem	Part	Course Category	Course Code	Title of the course	Credits	Hours	Int. Marks	Ext. Marks	Total Marks
		Core	17UZYC61	Core Paper -IX BIOCHEMISTRY BIOTECHNOLOGY	5	5	25	75	100
		Elective	17UZYE61	Elective-III-PHYSIOLOGY& EVOLUTION	5	5	25	75	100
		Elective	17UZYE62	Elective-IV-COMMERCIAL ZOOLOGY	5	5	23	75	
		Core	17UZYC6P	Core Subject X Practical-3 Biochemistry, Ecology Genetics, Biostatistics Molecular biology.	5	3	40	60	100
		Core	17UZYC6Q	Core Subject XI Practical-4- Microbiology, Physiology, Biotechnology & Evolution	5	3	40	60	100
VI	III Allied 17U	17UBYA41	Allied Subject – II paper IV Botany- Plant Physiology , forestry, applied Botany , Environmental Biology and Biodiversity	4	4	25	75	100	
		Allied Practical	17UBYA4P	Allied Subject II – practical II- Taxonomy of angiosperms, Embryology, Horticulture, Medicinal Plants, Economic Botany, Plant Physiology, forestry, applied Botany, Environmental Biology and Biodiversity	1	2	40	60	100
	IV	SBS	17UZYS61	Skill based Subject-IV ECONOMIC ENTOMOLOGY& SERICULTURE TECHNOLOGY	4	4	25	75	100
		VE	17UVED61	Value Education	2	4	25	75	100
	•	Total	·	·	31	30	295	705	800

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PART/SEM	I	II	III	IV	V	VI	Courses	Credits
I/Tamil	1T	1T	1T	1T			4	12
	6hrs	6hrs	6hrs	6hrs				
II/English	1T	1T	1T	1T			4	12
	6hrs	6hrs	6hrs	6hrs				
III / Core	1T+1P	1T+1P	1T+1P	1T+ 1P	2T+1P	1T+2P	11	51
	6h+6h	6h+6h	6h+6h	6h+ 6h	8h+12h	8h+12h		
Elective					1	1	2	10
					4h	4h		
Allied	1T+1P	1T+1P	2T+2P	2T+ 2P	1T+1P	1T+1P	12	35
	4h	4h	8h	8h	4h	4h		
IV / NME	1T	1T					2	4
	2h	2h						
SBS	1T	1T			1T	1T	4	10
	4h	4h			2h	2h		
VE						1T	1	2
						2h		
ES					1T		1	2
					2h			
V / EA					1T	1T	1	2
Total Hours	34	34	32	32	32	32		
Total Courses	8	8	8	8	8	8	42	
Total Marks							4200	
Total Credits								140

Department of Zoology Details of number of Courses and Credits

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)				
Year : I	Course Code:14UZYC11			
Semester: I	Hours:6			
Course Category: CORE- I	Credits:5			

INVERTEBRATA

Course outcomes:

- CO1: To learn the taxonomy of invertebrates.
- CO2: To learn the structure of representative invertebrates.
- CO3: To learn to sample and identify invertebrates in the lab and field.
- CO4: To understand the relationships between invertebrates and their environment.
- CO4:To understand the evolutionary relationships among the invertebrate groups.

Unit- I: TAXONOMY

- 1. Definition.
- 2. Principles of classification Symmetry and Coelom.
- 3. Units of classification Binomial nomenclature.
- 4. Outline classification of Animal kingdom upto class level with example. Flow chart only.
- General characters of the following phyla, i) Protozoa, ii) Porifera, iii) Coelenterata, iv) Platyhelminthes, v) Nematoda, vi) Annelida, vii) Arthropoda, viii) Mollusca, ix) Echinodermata.

Unit- II: PROTOZOA and PORIFERA

Protozoa

- 1. Paramecium (Type study) General organization, Cyclosis, Contractile vacuole and conjugation only.
- 2. Structure, pathology, prevention and control measures of i) Plasmodium vivax and ii) Entamoeba histolytica.

Porifera:

- 1. Olynthus (Type study). General organization, histology, Spicules, Reproduction and Development only.
- 2. Canal system in sponges.

Unit- III: COELENTERATA AND HELMINTHES

Coelenterata

- 1. Obelia (Type study) Structure of Obelia colony, Medusa and Nemeatocyst, Reproduction and development (Metagenesis).
- 2. Polymorphism in Coelenterata.

Helminthes:

- 1. Fasciola hepatica (Liver Fluke) Type study.
- External characters, Digestive system, Excretion, Reproduction and Development (Life cycle).
- 2. Structure, pathology, prevention and control measures of Ascaris and Wucheraria.

Unit-IV: ANNELIDA AND ARTHROPODA

Annelida:

- Earth worm Type study External morphology, Setae, Nephridia, Nervous system and Reproductive system only.
- 2. Metamerism in Annelids.

Arthropoda:

- 1. Penaeus (Marine Prawn) Type study. External morphology, Appendages, Respiratory system, Reproduction and Development.
- 2. Affinities of Peripatus.

Unit- V:MOLLUSCA AND ECHINODERMATA

Mollusca:

- 1. Pilaglobosa Type study
- External morphology, Digestive system, Respiratory system, Osphridium only.
- 2. Cephalopods as an advanced Mollusc.

Echinodermata:

- 1. Star fish Type study. External morphology, Pedicellaria, Water vascular system only.
- 2. Larval forms in Echinodermata.

Text book:

- ♦ A Text Book of Invertebrata N. Arumugam et al., (2010) Saras Publications,
- ✤ Invertebrate Zoology T.C. Majupuria, Pradeep Publications, Jalandar.
- Manual of Zoology M. EkambaranatheIyer and T.N. Ananthakrishnan, Vishwanathan publishers Chennai.
- ♦ Invertebrate Zoology E.L. Jordon and P.S. Verma. S. Chand and Company, New Delhi
- ✤ Invertebrate Zoology R.L. Kotpol, Rostogi publications, Meerut.
- ♦ Invertebrate Zoology P.S. Dhomi and J.K. Dhami, R.Chand Company, New Delhi.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)				
Year : I	Course Code:17UZYC2P			
Semester: I	Hours:2			
Course Category: Core Practical -I-Part -III	Credits:4			

INVERTEBRATA AND CHORDATA

(To be done at the end of the Second semester)

Course outcomes:

CO1: To learn the taxonomy of invertebrates.

CO2: To learn the structure of representative invertebrates.

CO3: To learn to sample and identify invertebrates in the lab and field.

CO4: To understand the relationships between invertebrates and their environment.

CO4:To understand the evolutionary relationships among the invertebrate groups.

Anatomical observation and Comments on the following systems (Models/Charts/Visual aids and Transparency)

Invertebrata:

Earthworm: Nerve ring and nerve cord, Mounting of Body setae & Penial setae.

Honey bee: Mouth parts & sting.

Cockroach: Digestive system and Nervous system.

Pila; Digestive system.

Pisces: Mounting of Placoid, cycloid &ptenoid scales.

Rat: Brain, Arterial system ,venous system& reproductive system

Frog: Arterial and Venous system

Shark: Cranial nerves.

Observation of larval forms of the following animals:

Liver fluke: Miracidium, Redia&Cercaria.

Prawn: Nauplius. Zoea& Mysis.

Any two Echinoderm larvae – Bipinnaria and Ophiopluteus.

Salamander: Axolotyl.

Spotters:

Protozoa: Paramecium, Paramecium conjugation, Euglena, Entamoeba, Plasmodium.

Porifera:Simp; e sponge, Sponge-Gemmule, Sponge –Spicules,

Coelenterata:, Hydra., Obelia colony, Obelia medusa, Jelly fish, Aurelia, Physalia, Sea anemone. **Helminthes**: Tape worm, Liver fluke, Ascaris (male and female).Wuchereria.

Annelida: Earthworm, Neries, Heteroneries, Chaetopterus, Leech

Arthropoda: Prawn, Peripatus, Octopus.

Echinoderm: Starfish.

<u>Chordata:</u> Amphioxus, Balanoglossus, SeaAscidians, any five edible fishes, Hippocampus,Narcine, Bufo, Salamander,Chaemeleon, Draco, Cobra, natrix, viper,krait, penguin, Pectoral, pelvic girdle of pigeon, Bat, Pangolin.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)				
Year : I	Course Code:17UCHA11			
Semester: II	Hours:4			
Course Category: Core Paper -I-Part -III	Credits:4			

Ancillary Chemistry Paper -I (Organic, Inorganic And Physical Chemistry)

Course Outcome: To study about the properties of hydrogen, oxides, water, electrophiles, nucleophiles, types of reactions, gaseous state, hybridization and MO theory.

Unit – I

Hydrogen: Isotopes of hydrogen – preparation, properties and uses of heavy hydrogen – hydrides – definition – classification – examples - Oxides – Definition – classification – examples. Water: Hardness of water – types of hardness – removal of hardness – industrial implications of hardness in water – estimation by EDTA method (outline only) - Units of hardness of water.

Unit – II

Detection of nitrogen and halogens in organic compounds – empirical formula – molecular formula – structural formula – simple calculation - Nature of valency of carbon in organic compounds –tetrahedral arrangement of valency of carbon - bond–breaking and bond forming in organic reactions – homolytic cleavage – heterolytic cleavage – reaction intermediates – formation, stability and reactions of carbocation, carbonium ion and free radicals - Nucleophiles – Electrophiles : Definition, types and examples - Type of reactions: Substitution – addition – elimination – rearrangement and polymerization – illustration with examples.

Unit – III

Gaseous state – Postulates of kinetic theory of gases – deducing the basic gas laws – Boyle's law, Charles law, Avogadro's law and Ideal gas equation - Deviation of real gases from ideal behavior – reasons for deviation – Derivation of van der Waals gas equation – explanation of behavior of real gases on the basis of van der Waals gas equation - Critical constants – definition only –Joule-Thomson effect – Inversion temperature - Liquefaction of gases – modern methods.

Unit - IV

Bonding : Orbitals – shapes of s and p orbitals – principle of hybridization – sp, sp² and sp³ hybridisation – methane, ethylene and acetylene – VSEPR theory - BeC ℓ_2 , BF₃, CH₄, PC ℓ_5 , SF₆, IF₇, H₂O and NH₃ - M.O. theory: Formation of M.O's – bonding and antibonding and non – bonding. M.O.'s – M.O. diagram for H₂, He and F₂.

Unit - V

Colloids

Colloidal states of matter – various types – classification - Sols – dialysis – electro osmosis – electrophoresis – stability of colloids – protective action – Hardy Schulze law – gold number -Emulsion: Types of emulsions – emulsifier with examples - Gels : Classification, preparation -Applications of colloids.

Reference books

- Essential of physical chemistry Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S. Chand, 2014).
- Principles of physical chemistry Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry R.D. Madan (revised edition, S. Chand, 2013).
- A Text book of Organic chemistry Arun Bahl, B.S. Bahl (revised edition, S. Chand, 2014).

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)

Year : I	Course Code:17UCHA2P
Semester: II	Hours:2
Course Category: Core Practical -I–Part -III	Credits:1

PRACTICAL I - VOLUMETRIC ANALYSIS VOLUMETRIC ANALYSIS

Course Outcome:

CO1: To determination of the concentration or the mass of the minimum formula from the titrated chemical material composing a pure liquid or a solution.

A double titration involving making up of the solution to be estimated or single titration involving making

up of the solution to be estimated and the preparation of a primary standard.

A. ACIDIMETRY AND ALKALIMETRY

- 1. Titrations between a strong acid and strong base.
- 2. Titrations between a strong acid and weak base.
- 3. Titrations between a weak acid and strong base.

B. PERMANGANIMETRY

1. Titrations between potassium permanganate and oxalic acid, ferrous sulphate and ferrous ammonium sulphate (Mohr's salt)

C. IODOMETRY (DEMONSTRATION ONLY)

1. Titrations of sodium thiosulphate with potassium permanganate and potassium dichromate.

Distribution of Marks

Maximum marks - 100

Duration of examination: 2 hrs

Internal – 40 marks	
Attendance in the class	20 marks
Model test	10 marks
Observation notebook	10 marks
Tota	d 40 marks
External – 60 marks	
Viva voce	10 marks
Record Notebook	10 marks
Procedure	10 marks
Estimation	30 marks
Tota	l 60 marks

Error calculation

Error	Marks
2-3%	30
3-4%	25
4-5%	15
> 5%	10

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : I	Course Code:17UZYS11	
Semester: I	Hours:2	
Course Category: SBS- I –Part -IV	Credits:2	

FISHERIES BIOLOGY

Course outcomes:

CO1: It gives increased understanding of the evolutionary origins of the major fish taxonomic Classes, with emphasis on the bony fishes.

CO2: It give greater understanding of the genetic and environmental factors regulating reproduction in fishes.

CO3: To gain an understanding of the various 'modes' of reproduction in fishes.

CO4: To study how abiotic factors influence adaptive capabilities in fishes.

Unit- 1:- Classification of Fisheries, Importance of Fisheries, Fisheries management, Fishing gears and crafts in India.

Unit- 2:

Food and feeding habit of fishes, Age and growth of fishes, Live & Artificial feeds.

Unit- 3:

Induced spawning of Indian Carps, Paddy cum fish culture, Monoculture, Composite fish culture, Sewage fed fisheries, Cage fish culture.

Unit-4:

Canning of fishes, Products of fishes – fish oil, CIFT.

Unit- 5 :

Economic importance of common South Indian fishes. Parasites and diseases of fishes.

Text books:

1. Aquaculture, N.Arumugam, Saras Publication, Nagercoil.

2. Fish and Fisheries, Pandey and Shukla, Rostogi Publication, Meerut.

Reference books:

1. Fish Biology, Srivastava, C.B.L. Narendra Publishing House, New Delhi.

2. Fish culture, Satyanarayana, V. (2009)

3. Fisheries Resources and Food Security, Saxena and Amita, Narendra Publishing House, New Delhi.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : I	Course Code:17UZYN11	
Semester: I	Hours:2	
Course Category: NME - I –Part -IV	Credits:2	

COMMERCIAL ZOOLOGY

(For non-biology students)

Course outcomes:

CO1: To understand the importance of beneficial insects and animals. CO2: To study the rearing methods of beneficial organisms- an economic perspective

Unit- 1: Dairy Farming

Introduction to dairy farming, Live stocks in India(Jersey, Buffaloes, Goat- Murrah. Jamunapari, Management of Model dairy farm, Livestockdisease(FMD,Udder)

Unit- 2: Apiculture

Definition: Species of Honey bees, SocialOrganisation.- Newton's Bee Hive,Location of Apiary-Honey extraction

Unit- 3: Sericulture

Definition: Species of Silk worms, Moriculture in general, Biology of Silkworm-Uses.

Unit- 4: Vermiculture

Definition: Species of Earthworms(Epigeic, Endogeic&Anaecic worms),Construction of Model Vermiculture Unit, Vermicomposting, Vermiwash - Uses

Unit- 5: Poultry Sciences

Definition: Modern Poultry House, Practical Aspects of Chick rearing, Vaccination Programme.

Text books:

- 1. Manual of Fresh water Aquaculture, Santhanam. R, Sukumaran.N and Natarajan.P, Oxford and IBH Publishing Co Pvt Ltd., New Delhi 1990.
- 2. A Text Book of Invertebrates, Armugam, N.A.(2008) Saras publication, Kottar.
- 3. The Earthworm Book, Sulthan Ahmed Ismail (2005) other India press.
- 4. Modern aspects of commercial Poultry Keeping: M.R. Gnanamani(1978), Giri Publication, Nagamalai, Madurai.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)

Year : I	Course Code:17UZYC21
Semester: II	Hours:6
Course Category: Core- II–Part -III	Credits:3

CHORDATA

Course outcomes:

CO1: Describe the distinguishing characteristics of chordates

CO2: Discuss the invertebrate chordate lineages

CO3: Identify the derived character of craniates that sets them apart from other chordates.

Unit- I:

Chordata characteristics, Outline classification upto class level with examples.

Type study: *Amphioxus* - External morphology, feeding and digestion. **General topics:**

- 1. Retrogressive metamorphosis in Ascidian.
- 2. Affinities of Balanoglossus.

Unit- II:

Classification of Fishes & Amphibians upto class level with examples.

Type study: Shark - External morphology, feeding and digestion. **Type study:** Frog - External morphology. **General topics:**

- 1. Migration of Fishes.
- 2. Parental care in Amphibia.

Unit- III:

Classification of Reptiles upto class level with examples.

Type study: Calotes- External morphology, Circulatory system only **General topics:**

- 1. Poisonous and non-poisonous snakes Identification and Biting mechanism.
- 2. Origin, dominance and decline of Mesozoic reptiles.

Unit-IV:

Classification of Aves upto orders level with examples.

Type study: Pigeon – External morphology, Respiratory system, Pectoral and Pelvic girdles only.

General topics:

- 1. Flight adaptations in birds.
- 2. Archraeopteryx and its Evolutionary importance.

Unit- V:

Classification of Mammals upto orders level with examples.

Type study: Rabbit - . External morphology, Digestive system, Nervous system and Urinogenital

system only.

General topics:

- 1. Dentition in mammals.
- 2. Adaptation of aquatic mammals.

Text books:

- 1. Chordate Zoology (2006 reprint) E. Jordon & P.S. Verma , Chand and Co. New Delhi.
- 2. Text book of vertebrate-N. Arumugamet al., (2008) Saras Publications, Nagercoil.

Reference books:

- 1. A manual of Zoology, EkamnbaranathaAyyar, M. &Ananthakrioshnan, T.N. Vol. II Chordata: S.ViswanathanPvt Ltd, Chennai.
- 2.Vertebrata Kotpal, R.M. (2005 Reprint) RastogiaPublishers, Meerut. References:
- 3. The Chordates II Alexander, R.MCN (1981) International Edition New Delhi.
- 4. Comparitive Anatomy of Vertebrates, Kent. C. George, Mosby International Edition, Japan.
- 5. The vertebrate Body, Romer, R.S. & Parson, T.S. (1996) VII Edition, Philadelphia.
- 6. .ChordateZoolgy (2006 Reprint) P.S. Dhami& J.K. Dhami, Chand & Company, New Delhi.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : I	Course Code:17UZYC2P	
Semester: II	Hours:2	
Course Category: Core Practical -I-Part -III	Credits:4	

INVERTEBRATA AND CHORDATA

(To be done at the end of the Second semester)

Course outcomes:

CO1: Describe the distinguishing characteristics of chordates

CO2: Discuss the invertebrate chordate lineages

CO3: Identify the derived character of craniates that sets them apart from other chordates.

Anatomical observation and Comments on the following systems (Models/Charts/Visual aids and Transparency)

Invertebrata:

Earthworm: Nerve ring and nerve cord, Mounting of Body setae & Penial setae.

Honey bee: Mouth parts & sting.

Cockroach: Digestive system and Nervous system.

Pila; Digestive system.

Pisces: Mounting of Placoid, cycloid &ptenoid scales.

Rat: Brain, Arterial system ,venous system& reproductive system

Frog: Arterial and Venous system

Shark: Cranial nerves.

Observation of larval forms of the following animals:

Liver fluke: Miracidium, Redia&Cercaria. Prawn: Nauplius. Zoea& Mysis.

Any two Echinoderm larvae – Bipinnaria and Ophiopluteus.

Salamander: Axolotyl.

Spotters:

Protozoa: Paramecium, Paramecium conjugation, Euglena, Entamoeba, Plasmodium.

Porifera:Simp;e sponge, Sponge-Gemmule, Sponge –Spicules,

Coelenterata:, Hydra., Obelia colony, Obelia medusa, Jelly fish, Aurelia, Physalia, Sea anemone. **Helminthes**: Tape worm, Liver fluke, Ascaris (male and female).Wuchereria.

Annelida: Earthworm, Neries, Heteroneries, Chaetopterus, Leech

Arthropoda: Prawn, Peripatus, Octopus.

Echinoderm: Starfish.

<u>Chordata:</u> Amphioxus, Balanoglossus, SeaAscidians, any five edible fishes, Hippocampus, Narcine, Bufo, Salamander, Chaemeleon, Draco, Cobra, natrix, viper, krait, penguin, Pectoral, pelvic girdle of pigeon, Bat, Pangolin.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : I	Course Code: 17UCHA21	
Semester: II	Hours:4	
Course Category: Allied Paper -I-Part -III	Credits:4	

(Organic And Physical Chemistry) Ancillary Chemistry Paper -II

Course Outcome: To gain knowledge about nuclear chemistry, carbohydrates, stereoisomerism, chemotherapy, dyes, aminoacids and proteins.

Unit – **I** - **Nuclear Chemistry**

Composition of the nucleus – nuclear forces – mass defect – binding energy – nuclear stability - Soddy's group displacement law – illustration - Nuclear fission: Definition –application of fission – principle of atom bomb - Nuclear fusion: Definition – emission of energy – Stellar energy – hydrogen bomb - Applications of radioactivity in medicine, agriculture, industry and analytical fields – carbon dating.

Unit - II

Carbohydrates: Definition – classification – monosaccharides – properties and uses of glucose and fructose –Haworth structure (glucose only) – conversion of glucose to fructose and vice versa, mutarotation - Disaccharides: Sucrose – structure – distinction between sucrose, glucose and fructose - Polysaccharides: Starch and cellulose (Structure only) – cellulose derivatives.

Unit – III

Stereoisomerism – chiral centre – optical activity of compounds containing one or two chiral centers (lactic and tartaric acid) – R-S notation – enantiomers – diastereoisomers – racemization – resolution - Geometrical isomerism of maleic and fumaric acids - E-Z notation of geometrical isomers.

Unit – IV

Chemotheraphy: Sulpha drugs – sulphadiazine – sulphanilamide –preparation and applications - Antimalarials – chloroquine and plasmoquine - Arsenical drugs: Salvarasan – 606 and neosalvarasan - Antibiotics: Definition – classification – penicillin - amoxicillin – ampicillin – tetracyclin – streptomycin – mode of application – uses only.

Hormones: structure - source - importance of testosterone - progesterone - thyroxin.

Unit – V

Amino acids and proteins: Classification – synthesis – properties of amino acids – action of heat, dipolar ion, iso-electric point, and Ruhemnn's purple - polypeptides – proteins – classification and biological functions.

Dyes : Definition – theory of colour and constitution – classification based on structure and applications – preparation of methyl orange – Bismark brown, malachite green – vat dye – indigo.

Reference books

- Essential of physical chemistry Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S. Chand, 2014).
- Principles of physical chemistry Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry R.D. Madan (revised edition, S.Chand, 2013).
- A Text book of Organic chemistry Arun Bahl and B.S. Bahl (revised edition, S. Chand, 2014).
- ▶ J. Ghosh Fundamental concepts of Applied Chemistry, S. Chand & Co.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
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Year : I	Course Code:17UCHA2P
Semester: II	Hours:2
Course Category: Allied Practical -I–Part -III	Credits:1

PRACTICAL I - VOLUMETRIC ANALYSIS VOLUMETRIC ANALYSIS

Course Outcome:

CO1: To determination of the concentration or the mass of the minimum formula from the titrated chemical material composing a pure liquid or a solution.

A double titration involving making up of the solution to be estimated or single titration

involving making up of the solution to be estimated and the preparation of a primary standard.

A. ACIDIMETRY AND ALKALIMETRY

- 4. Titrations between a strong acid and strong base.
- 5. Titrations between a strong acid and weak base.
- 6. Titrations between a weak acid and strong base.

B. PERMANGANIMETRY

2. Titrations between potassium permanganate and oxalic acid, ferrous sulphate and ferrous ammonium sulphate (Mohr's salt)

C. IODOMETRY (DEMONSTRATION ONLY)

2. Titrations of sodium thiosulphate with potassium permanganate and potassium dichromate.

Distribution of Marks

Maximum marks - 100

Duration of examination: 2 hrs

Internal – 40 marks		
Attendance in the class		20 marks
Model test		10 marks
Observation notebook		10 marks
	Total	40 marks
External – 60 marks		
Viva voce		10 marks
Record Notebook		10 marks
Procedure		10 marks
Estimation		30 marks
	Total	60 marks

Error calculation

Error	Marks
2-3%	30
3-4%	25
4-5%	15
> 5%	10

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : I	Course Code:17UZYS21	
Semester: II	Hours:2	
Course Category: Skill -II –Part -IV	Credits:2	

POULTRY SCIENCE

Course outcomes:

CO1: To learn about all aspects of raising poultry for their meat and eggs.

CO2: To develop a business plan which will show if people can make money out of a poultry farming enterprise operation in their country or region under the present conditions.

Unit – I

Choosing commercial layers and Broilers.

Types of poultry housing – litter system, 1:3 system, cage rearing. Unit – II 6 hours Practical aspects of Chick rearing. Management of layers. Management of Broilers. Unit – III Lighting programmes. Summer and Winter management. Debeaking Unit IV

Non – nutritive feed additives. Feed stuff for poultry. Feed formulation. Unit – V Viral, Bacterial and Fungal diseases(Ranikhet , Fowl typhoid, Aspergillosis) Parasitic diseases (Coccidiosis& any two) Vaccination programme.

Text Books:

Modern aspects of commercial Poultry Keeping, M.R. Gnanamani, Ninth Edition, (2003).Giri Publication, Nagamalai, Madurai.

ReferenceBooks:

- 1. Poultry keeping in India, Naidu. P.M.N, Indian Council of Agricultural Research, New Delhi- 1959
- 2. Nutrition of the Chicken, Scott, M.L. Nesmehi.M.C, and R.J.Young, New York. Poultry Production, singh.R.A. New Delhi.

3.Diseases of Poultry, H.E.Biester and Schwarte, Published by Oxford

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : I	Course Code:17UZYA21
Semester: II	Hours:2
Course Category: NME-II –Part -IV	Credits:2

ORNAMENTAL FISH CULTURE (For non biology students)

Course outcomes:

CO1: To collect baseline data on the ecosystem, socio-economy and diversity of fishes and to analyze the impact of the aquarium fish trade on social and natural environments.

CO2: To encourage local entrepreneurship, eco-tourism, the production of local crafts and the commercialization of other sustainable natural resources

Unit – I

Identification of popular Ornamental fishes:

Siamese fighting fish, Gold fish, Rosy barb, Tiger barb, Angel fish, Black molly, Guppy and Sword tail.

Unit – II

Construction of fish tank:

Size and shape of fish tank, bottom settings, stocking of fish, Accessories of fish tank – aerators, types of filters, nets, lights and hood.

Unit – III

Transport of fishes: Oxygen packing.

Food and feeding: culture of live food organisms-chironomous larva and tubifex.

Artificial feed.

Unit IV

Breeding methods:

Siamese fighting fish, Gold fish, Black molly, Guppy and Sword tail.

Unit – V

Common diseases and treatment of ornamental fishes:

White spot diseases, Fungal diseases, Bacterial diseases, Dropsy and ectoparasites.

Text book:

Manual of Ornamental fishes and forming technologies, Jameson J.D & R. Santhanam, 1996, Fisheries college & Research Institute, Tamil Nadu.

References:

- 1. Manual of tropical fish diseases diagnosis. Felix S. Sunderraj and S. Thilakar, Tamil Nadu Veterinary & Animal Sciences University, Chennai.
- 2. Manual of Breeding & Larval rearing of Cultivable fishes, Ramanathan, N and T,Francis, Tamil Nadu Veterinary & Animal Sciences University, Chennai.
- 3. Manual of Aquatic Engineering, Sampathkumar J.S. &Sundararaj.V. Tamil Nadu Veterinary & Animal Sciences University, Chennai.

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : I1	Course Code:17UZYC31
Semester: III	Hours:4
Course Category: Core - IV -Part -III	Credits:4

CELL & MOLECULAR BIOLOGY

Course outcomes:

CO1: List the fundamental features of prokaryotic and eukaryotic cells and methods used to examine them.

CO2: Describe the structure, composition and role of eukaryotic cell membranes.

CO3: Recognise and give roles for the major cell organelles

CO4: To study the physical and functional characterization of genomes

CO5: To study on the expression of genomic information in cellular and cell-free systems.

Unit- I:

Microscopy: Compound and Electron microscopy – structure, magnification, resolution power and applications.

Cytological techniques: 1) Fixation type - fixation and fixatives. 2) Staining, types of staining and Cyto-chemical staining methods. 3) Centrifugation, Ultra centrifuge, Sedimentation co-efficient.

Unit- II:

Ultra structure and functions of 1.Plasmamembrane, 2.Mitochondria, 3.Golgi apparatus 4.Endoplasmic reticulam and Ribosomes.Ultrastructure and functions of 5.Lysosomes 6.Centrioles 7.Nucleus 8.Chromosome and 9.Giant chromosomes.

Unit-III:

Cell division: Cell cycle, Amitosis, Mitosis and Meiosis.

Comparison between Mitosis and Meiosis, Mitotic apparatus, synaptinemal complex and Genetic significance of Meiosis.

Cancer: origin, sites of Infection, Characteristics Metastasis, Ill effects, types, causes, diagnosis, treatment and Oncogenes.

UNIT IV:

Nucleic acids : Structure and types of DNA, RNA, DNA replication.

1. Experimental proof of DNA & RNA as genetic material.

UNIT V:

- 1. Genetic code: features.
- 2. Gene action: Protein synthesis and processing. Transcription and translation in Prokaryotes.

Text Books:

1. A text book of Cell Biology- N. Arumugam et al., (2010) Saras Publications.

ReferenceBooks:

- 1. Cell Biology De Robertis, E.D. Nowinski and Saez. (2001 reprint) WB Saunders Co. Philadelphia.
- 2. Cell Biology Ambrose E.J., Dorothty M.E., (2002) ELBS camlet press, GB.
- 3. Cell and Molecular Biology De Robertis and De Robertis. (2004 reprint)3
- 4. Molecular Biology davidFreifelter(II edition 2005) New Delhi. Cell Biology. De Robertis, E.D. Nowinski and Saez. (2001 reprint) WB Saunders Co. Philadelphia.
- 5. Cell Biology Ambrose E.J., Dorothty M.E., (2002) ELBS camlet press, GB.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : I1	Course Code:17UZYC4P
Semester: III	Hours:2
Course Category-Core practical –III – Part-III	Credits:2

Cell Biology, Molecular Biology, & Developmental Biology

Course outcomes:

CO1: List the fundamental features of prokaryotic and eukaryotic cells and methods used to examine them.

CO2: Describe the structure, composition and role of eukaryotic cell membranes.

CO3: Recognise and give roles for the major cell organelles

CO4: To study the physical and functional characterization of genomes

CO5: To study on the expression of genomic information in cellular and cell-free systems.

Cell & Molecular Biology

- 1. Microscopy: Handling of dissection microscope and Compound microscope.
- 2. Observation of Mitotic Stages in Onion Root tip- Squash Preparation
- 3. Observation of Meiotic stages in Grasshopper testis- Squash Preparation
- 4. Charts on Mitochondria, Golgi apparatus, Endoplasmic reticulum, Ribosome and Chromosomes.
- 5. Observation of Polytene chromosome in Chironomous larva.
- 6. Human Blood smearing, Preparation of Squamous epithelium
- 7. Charts on Blood cells RBC and WBC.
- **8.** DNA, RNA & Protein synthesis-model

Developmental Biology:

- 1. Stages of Chick Blastoderm (24,48,72& 96hrs)
- 2. Frog- Egg, Sperm, Cleavage, Blastula, Gastrula, & Metamorphosis in Frog,
- 3. Observation of mammalian Egg& Oogenesis and Sperm& Spermatogenesis.
- 4. Placenta of sheep(Cotyledonary type)& Pig(Diffuse)

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : II	Course Code:17UCHA31
Semester: III	Hours:4
Course Category: Allied Paper -III-Part -III	Credits:4

Ancillary Chemistry Paper - III

(Organic, Inorganic And Physical Chemistry)

Course Outcome: To comprehend adsorption, catalysis, polymers, photochemistry, coordination compounds and fertilizers.

Unit – I

Adsorption: Definition – difference between adsorption and absorption – adsorbate, adsorbent – physical adsorption – chemical adsorption – differences between these two types – factors influencing adsorption – adsorption of gases on solid surface – adsorption isotherm – Freundlich isotherm – Langmuir isotherm.

Unit – II

Catalysis : Definition – different types of catalysis – acid-base catalysis – surface catalytic reactions – definition and examples – autocatalyst – catalytic poisoning – promoters – enzyme catalysis – characteristics- Michaelis-Menten equation.

Polymers : Definition – classification of polymers – properties of polymers – addition and condensation polymerization reactions with examples – natural rubber – isoprene Unit – vulcanization of rubber – preparation and applications of polystyrene, urea – formaldehyde resin, Teflon and Buna-S-rubber.

Unit – III

Photochemistry: Comparison of thermal and photochemical reactions – definition of photochemical reactions – laws of photochemistry – Grotthus-Draper law – Einstein law – quantum efficiency – reasons for low and high quantum yield with examples – consequence of light absorption by atoms and molecules – Jablonski diagram – fluorescence – phosphorescence – photosensitization – chemiluminescence – bioluminescence – applications of photochemistry.

Unit – IV

Coordination compounds: Definition – nomenclature – definition of various terms involved in coordination chemistry – classification of ligands-Werner's theory, EAN rule – VB theory – Nickel carbonyl – chelates.

Unit – V

Fertilizers: plant Nutrients -Role of NPK in plant growth-classification of fertilizersnatural and chemical fertilizers-urea-super phosphate –triple super phosphate -potassium nitratepotassium chloride -ammonium nitrate -calcium ammonium nitrate (CAN) and complex fertilizer fertilizer industries in India.

Reference books

- Essential of physical chemistry Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S. Chand, 2014).
- Principles of physical chemistry Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry R.D. Madan (revised edition, S. Chand, 2013).
- A Text book of Organic chemistry Arun Bahl and B.S. Bahl (revised edition, S. Chand, 2014).
- ▶ J. Ghosh Fundamental concepts of Applied Chemistry, S. Chand & Co.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : II	Course Code:17UCHA4P
Semester: III	Hours:2
Course Category: Allied Paper -III–Part -III	Credits:1

PRACTICAL II - ORGANIC ANALYSIS

Course Outcome: To comprehend adsorption, catalysis, polymers, photochemistry, coordination compounds and fertilizers.

ORGANIC ANALYSIS

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative / colour reactions - acids, phenols, aldehydes, esters, amines (primary, secondary and tertiary), amides, anilides, aliphatic diamide and monosaccharide.

Distribution of Marks

Maximum marks – 100

Duration of examination: 2 hrs

Internal – 40 marks	
Attendance in the class	20 marks
Observation notebook	10 marks
Model test	10 marks
Total	40 marks

External – 60 marks		
Viva voce	10 marks	
Record Notebook	10 marks	
Preliminary reactions	5 marks	
Detection of element	5 marks	
Aliphatic / Aromatic	5 marks	
Saturated / Unsaturated	5 marks	
Detection of functional group	15 marks	
with correct procedure		
Derivative / Colour reaction	5 marks	
Total	60 marks	

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : II	Course Code:17UBYA11
Semester: III	Hours:4
Course Category: Allied Paper -I-Part -III	Credits:4

Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms

Course Outcomes:

1. To have a comprehensive knowledge of *Algae*, *Fungi*, *Bryophytes*, *Pteridophytes* and *Gymnosperms*.

2.To gain the knowledge about the economic importance of algae and fungi.

3.To know about the internal structure of Funaria

4. To know about the internal structure and economic importance of *Pteridophytes* and *Gymnosperms*.

<u>Algae.</u>

General Characters, Structure and reproduction of the following

- a. Nostoc Cyanophyceae
- b. Volvox Chlorophyceae
- c. Sargassum Pheaophyceae
- d) Polysiphonia Rhodophyaceae

<u>Unit - II Fungi</u>

Unit – I

General Characters, Structure and reproduction of the following

a. Aspergillus - Ascomycetes

b. Yeast-Sacromycetes

c.Agaricus - Basidiomycetes

d) Economic importance of fungi

<u>Unit - III Bryophyte</u>

General characters, structure and reproduction of **Funaria**

Unit - IV Pteridophytes

General characters, structure and reproduction of Selaginella

Unit - V Gymnosperms

General characters, structure and reproduction of **Pinus.**

Reference Books

- 1. Histology, pteridophytes and Gymnoperms -Annie Ragland -saras publication, 2000.
- 2. A text book of Algae –V.J. Chapman-Macmillan,1968.
- 3. Algae, Fungi, Bryophytes- Annie Ragland –saras publication, 2006.
- 4. Algae& Bryophytes Annie Ragland-saras publication, 1999.
- 5. Fungi –B.R. Vashishta –S.chand &co -2000
- 6. Algae Fritsch-Vikas publishing house (P) 1977
- 7. Pteridophyts –S.chand, 2000.
- 8. Gymnosperms -Vashistha –S.chand,2004
- 9. Gymnosperms –O.P. Sharma –Pragati Prakash -1987.
- 10. College Botany Dr.B.P.Pandey Vol.I, 2015.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : II	Course Code:17UBYA2P
Semester: III	Hours:2
Course Category: Allied Practical -I-Part -III	Credits:

Course Outcomes:

1. To have a comprehensive knowledge of *Algae*, *Fungi*, *Bryophytes*, *Pteridophytes* and *Gymnosperms*.

2.To gain the knowledge about the economic importance of algae and fungi.

3.To know about the internal structure of *Funaria*

4. To know about the internal structure and economic importance of *Pteridophytes* and *Gymnosperms*.

Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Pathology, Anatomy, Genetics and Plant Breeding

- 1. Micro preparation of plants mentioned in plant diversity.
- 2. Cutting, mounting and submission of Selaginella stem and pinus Needle
- 3. Spotters Identification of slides specimens mentioned in the syllabus.
- 4. Cutting and mounting of angiosperm stem and root
- 5. Record Note and Observation note submission

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : II	Course Code:17UZYC41
Semester: IV	Hours:4
Course Category: Part -III – Core-V	Credits:4

DEVELOPMENTAL BIOLOGY

Course outcomes:

CO1: Indicate the principal historical stages and methodological approaches to the study of embryonic development and the characteristics of the principal experimental models.

CO2: Identify embryonic structures in preparations, photographs and diagrams.

CO3: Arrange sequences in developmental processes in order.

CO4: Identify the homologies, similarities and differences between structures and processes in the developmental models studied.

CO5: Indicate the derivatives of embryonic structures.

CO6: Attain a basic conceptual knowledge of the principal cellular mechanisms of development and identify the genetic and molecular elements that are involved.

CO7: Explain the clinical implications of development and the mechanisms that intervene in developmental alterations.

Unit- I:Introduction to Developmental Biology

Introduction to developmental biology, Theories: Preformation, Epigenesis, Germplasm. Law's: VonBaer's, Biogenetic law, Phases of development, Gametogenesis: Mammalian Sperm -Structure and types, Spermatogenesis. Mammalian Ovum -Structure and types, Oogenesis.

Unit- II:

Fertilization: Types & process of fertilization. Biochemical & Physiological events, Parthenogenesis- its types, Cleavage- definition, planes, and Law's.Fate map of frog- blastulation& gastrulation.

Unit- III: Organogenesis: Development of Brain & Heart – frog,Placentation in Mammals-Definition, types, Classification- On the basis of foetal membranes & villi – functions,Extra embryonic membranes- Chick.

Unit- IV:

Organiser- Process of induction, Amphibian metamorphosis- Definition, Ecological, Morphological& Physiological changes, Regeneration- Definition, types, regeneration of limb in salamander.

Unit- V: Human reproduction: Puberty, Menopause, Menstrual cycle, Pregnancy, Parturition & lactation, Birth Control: Contraception, its types.Infertility method to overcome- IUI, IVF, Test tube baby- Ethical issues.

Text books:

- 1. Chordate Embryology, Verma. S. And Agarwal V.K., (2000), S.Chand& Co., New Delhi.
- 2. Text Book of Embryology, Armugam, N.A.(2008) Saras publication, Kottar.

Reference Books:

- 1. An Introduction to Embryology. Balinsky, B.I.1981. W.B.Saunderscompany, Philadelphia.
- 2. Developmental Biology, Berril, N.J., 1986, McGraw Hill, New Delhi.
- 3. Developmental Biology, Browder L.W. Erickson C.A. Williams, (1992) 3rd Edition, R.J. Saunders College Publications, London.
- 4. Foundations of Embryology, Patten, B.M., 1958, McGraw Hill, New York.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : I1	Course Code:17UZYC4P
Semester: IV	Hours:2
Course Category-Core practical–III – Part-III	Credits:2

Cell Biology, Molecular Biology, & Developmental Biology

Course outcomes:

CO1: List the fundamental features of prokaryotic and eukaryotic cells and methods used to examine them.

CO2: Describe the structure, composition and role of eukaryotic cell membranes.

CO3: Recognise and give roles for the major cell organelles

CO4: To study the physical and functional characterization of genomes

CO5: To study on the expression of genomic information in cellular and cell-free systems.

Cell & Molecular Biology

- 1. Microscopy: Handling of dissection microscope and Compound microscope.
- 2. Observation of Mitotic Stages in Onion Root tip- Squash Preparation
- 3. Observation of Meiotic stages in Grasshopper testis- Squash Preparation
- 4. Charts on Mitochondria, Golgi apparatus, Endoplasmic reticulum, Ribosome and Chromosomes.
- 5. Observation of Polytene chromosome in Chironomous larva.
- 6. Human Blood smearing, Preparation of Squamous epithelium
- 7. Charts on Blood cells RBC and WBC.
- **8.** DNA, RNA & Protein synthesis-model

Developmental Biology:

- 1. Stages of Chick Blastoderm (24,48,72& 96hrs)
- 2. Frog- Egg, Sperm, Cleavage, Blastula, Gastrula, & Metamorphosis in Frog,
- 3. Observation of mammalian Egg& Oogenesis and Sperm& Spermatogenesis.
- 4. Placenta of sheep(Cotyledonary type)& Pig(Diffuse)

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : I1	Course Code:17UCHA41
Semester: IV	Hours:4
Course Category-Allied paper–III – Part-III	Credits:4

Ancillary Chemistry Paper- IV

(Organic And Physical Chemistry)

Course Outcome: To understand heterocyclic compounds, alkaloids, vitamins, antibiotics, chemical kinetics, chromatography, chemotherapy and electrochemistry.

Unit – I

Heterocyclic compounds – preparation and reactions of pyrrole, furan, pyridine, quinoline, isoquinoline (Structural elucidation & synthesis not necessary).

Unit – II

Alkaloids – definition - pharmacological properties and importance of the following alkaloids – nicotine, quinine, piperine and cocaine (Structural elucidation not necessary).

Vitamins - Classification and biological functions of vitamins A, B_6 , B_{12} , C, D, E and K (Structural elucidation not required) - Antibiotics Classification and biological functions of antibiotics – penicillin, chloroamphenicol, streptomycin and tetracyclin (uses and structure only)

Unit – III

Chemical kinetics: Rate of reaction-rate law and rate constant – order and molecularity of a reaction – zero order – first order- second order reaction – examples. First order rate equation and half life period – derivation–Pseudo first order reactions- Carbon dating.

Unit-IV

Chromatographic technique: Principle – classification -adsorption and partition Chromatography- thin layer chromatography – column chromatography (adsorption) – paper Chromatography – gas-solid and gas-liquid chromatography- applications of each type- ion exchange chromatography.

Chemotheraphy - Sulpha drugs -sulphadiazine-sulphanilamide -preparation and applications. Antimalarials; Chloroquine and plasmoquine-Arsenical drugs; Salvarasan 606, Neosalvarasan

Unit –V

Electrochemistry:

 P^{H} – Definition - simple calculation of P^{H} from Molarity of acids and bases - common ion effect - its application in analytical chemistry - buffer solution - definition - theory of buffer action – applications.

Acid – base indicators-working range - commercial cells and batteries - primary and secondary cells - Weston – cadmium cell - lead storage cell - electroplating - principle and methods.

Reference books

- Essential of physical chemistry Arun Bahl, B.S. Bahl and G.D. Tuli (revised edition, S.Chand, 2014).
- Principles of physical chemistry Puri, Sharma and Pathania (revised edition, Vishal pub., 2014).
- Modern Inorganic chemistry R.D. Madan (revised edition, S.Chand, 2013).
- A Text book of Organic chemistry Arun Bahl, B.S. Bahl (revised edition, S.Chand, 2014).
- ▶ J. Ghosh Fundamental concepts of Applied Chemistry, S. Chand & Co.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : I1	Course Code:17UCHA4P
Semester: IV	Hours:2
Course Category-Allied practical –III – Part-III	Credits:1

PRACTICAL II - ORGANIC ANALYSIS

Course Outcome: To comprehend adsorption, catalysis, polymers, photochemistry, coordination compounds and fertilizers.

ORGANIC ANALYSIS

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of a solid derivative / colour reactions - acids, phenols, aldehydes, esters, amines (primary, secondary and tertiary), amides, anilides, aliphatic diamide and monosaccharide.

Distribution of Marks

Maximum marks – 100

Duration of examination: 2 hrs

Internal – 40 marks	
Attendance in the class	20 marks
Observation notebook	10 marks
Model test	10 marks
Total	40 marks

External – 60 marks	
Viva voce	10 marks
Record Notebook	10 marks
Preliminary reactions	5 marks
Detection of element	5 marks
Aliphatic / Aromatic	5 marks
Saturated / Unsaturated	5 marks
Detection of functional group	15 marks
with correct procedure	
Derivative / Colour reaction	5 marks
Total	60 marks

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : I1	Course Code:17UBYA21	
Semester: IV	Hours:4	
Course Category-Allied paper –III – Part-III	Credits:4	

Microbiologyand pathology, Anatomy, Plant Breeding, Genetics and Evolution

Course Outcomes:

- 1.To understand the basic knowledge in microbiology
- 2. To gain the knowledge in Anatomy
- 3.To know the various methods of plant breeding techniques.
- 4.To gain the knowledge from genetics
- 5.To know the evolution and origin of life

<u>Unit – I</u> <u>Microbiology and Pathology</u>

- a. Bacteria -structure and reproduction
- b. Virus structure and reproduction
- c. Bunchy top of banana
- d. Citrus canker

<u>Unit – II</u> <u>PlantAnatomy</u>

- a. Meristems Types of meristems
- b. Structure of monocot stem and Dicot stem
- c. Structure of monocot root and Dicot root
- d. Internal structure of Dicot leaf

<u>Unit – III</u> <u>Plant Breeding</u>

- a. Mutation Breeding
- b. Polyploidy Breeding
- c. Hybridization techniques& methods
- d. Transgenic plants

<u>Unit – IV</u> <u>Genetics</u>

- a. Mendel's Laws of Inheritance.
- b. Monohybrid ratio
- c. Dihybrid ratio
- d. Incomplete Dominance

<u>Unit – V</u> <u>Evolution</u>

- a. Origin of life
- b. Origin of Earth and its primitive atmosphere.
- c. Lamarckism theory

d.Darwins theory of Natural selection.

Reference Books

- 1. Modern Botany Naveen Malavia, scientific publishers -2008
- 2. Cytology, Genetics, Evolution N. Arumugam, Saras publications, 2004
- 3. Cell biology,molecular biology,genetics,immunology and biotechnology –N Arumugam Saras publications -2002

4.	Genetics -		P.S. Varma & Agarwal S.chand -2007
5.	Plant Breeding -		V.Kumaresan. saras publication -2003
6.	Cell biology -		Arumugam – saras publications -2005
7.	Cell & Molecular Biolo	ogy-	Arumugam – saras publications -2010
8.	Plant breeding _		V.L.Chopra –oxford &IBH Publishing co pvt.Ltd 1988
9.	Biotechnology -		Kumaresan saras publications -2009
10.	Organic evolution –		N Arumugam –saras publications ,2004
11.	Organic Evolution -		V.B. Rastogi - kadernath Ramnath -2006

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : I1	Course Code:17UBYA2P	
Semester: IV	Hours:2	
Course Category-Allied practical –III – Part-III	Credits:1	

Course Outcomes:

1. To have a comprehensive knowledge of *Algae*, *Fungi*, *Bryophytes*, *Pteridophytes* and *Gymnosperms*.

2.To gain the knowledge about the economic importance of algae and fungi.

3.To know about the internal structure of Funaria

4.To know about the internal structure and economic importance of *Pteridophytes* and *Gymnosperms*.

Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Pathology, Anatomy, Genetics and Plant Breeding

- 1. Micro preparation of plants mentioned in plant diversity.
- 2. Cutting, mounting and submission of Selaginella stem and pinus Needle
- 3. Spotters Identification of slides specimens mentioned in the syllabus.
- 4. Cutting and mounting of angiosperm stem and root
- 5. Record Note and Observation note submission

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : III	Course Code:17UZYC51	
Semester:V	Hours:5	
Course Category: Core -VII –Part –III	Credits:5	

ECOLOGY & EVOLUTION

Course outcomes:

- CO 1: To study about the local and geographical distribution and abundance of organisms (habitat niche, community, bio-geography).
- CO2: Charles Darwin and his contribution to the theory of evolution
- CO3: Define natural selection and how it relates to evolution
- CO4: The relationship between natural selection and evolution

Unit- I:Abiotic factors

Light: Spectral compositions, Light on land and in water, Biological effects of Light(effect on metabolism, reproduction, pigmentation, development, locomotion and movement, diurnal migration only). Temperature: Range, diurnal variation, thermal stratification and biological effects (metabolism, reproduction, development, morphology and cyclomorphosis only)'

Unit- II: Habitat & Community Ecology

Fresh water: Types of ponds and pond fauna.Marine water: Characteristics stratification, plain muddy shore and deep sea adaptations.Estuaries: Fauna and their adaptations.Definition to Community, characteristics, diversity, ecotone and edge effect and ecological niche, equivalence and ecological succession.Ecosystem – Definition, components, food chain and its types, food-web, ecological pyramid. Bio-geochemical cycles – carbon, phosphorous and nitrogen cyclers.

Unit- III:PopulationEcology,Pollution&Social issues

Natality, mortality, age distribution, growth factors, fluctuation and equilibrium, dispersal and distribution, regulation of population. Animal relationship - Intraspecific and interspecific relationship, neutralism, mutualism, commensalism, parasitism, predation and competition. Causes, effects and control measures of air, water pollutions. Climatic change, green house effect and global warning, acid rain, Ozone layer depletion, Bhopal episode, stone leprosy in TajMahal and minamata diseases.

Unit- 1V: EVOLUTION

Theories of origin of life(Abiogenesis and Biogenesis).Evidences – morphological, Embryological, Biochemical and Paleontological evidences.Lamarckism and Neo – Lamarckism.Darwin voyage to Galapagos island.Darwinism and Neo – Darwinism.Micro and Macroevolution – Elementary forces and Mechanism with example.Adaptivecolouration, Mimicry – Betasian and Mullerian types, Co-evolution.Archraeopteryx and its Evolutionary importance.

Unit V

Hardy-weinberg Law and evolution.Isolation – Isolating mechanism and role of isolation in Speciation.Species concepts, mechanism of Allopatric and Sympatric speciation. Fossils; Types, methods of Fossilization, methods of dating fossils, geological time table Human evolution _ Fossil records, cultural evolution and future evolution of Man

Text Books:

1. Organic Evolution, Rastogi, V.B., (2003) KedarNath and Ram Nath, Meerat.

2. Fundamentals of Ecology – E.P.Odum 1985) w.r.Saunders Publications, Philedeophia.

Reference Books

1. Animal Species and Evolution, Mayr, E

2.An Introduction of Evolution, Moody, P.A., KalyaniPublisghers, Ludhiana.

3. Major features of Evolution, simpson, G.GThe Vertebrate story, Romer., A.S.

4. Evolution, Dobzhansky, Ayala, stebbin and Valentine

5.Concept of Ecology – N.Arumugam (2009), Saras Publication, Nagercoil.6.Enviropnmental Ecology– P.D.Sharma (2006) Rastogi Publication, Meerut.7.ProcessofOrganicevolution,Stabbins8.Fundamentals of Ecology – M.C.Dash (2996) Tata Mc.Grow Hill publishing ltd, New Delhi.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)

Year : III	Course Code:17UZYC52
Semester: V	Hours:5
Course Category: Core-VIII-Part –III	Credits:5

GENETICS AND BIOSTATISTICS

Course outcomes:

CO1: To understand the Mendelian and non mendelian modes of inheritance

CO2: To govern passage of genetic traits across generation

CO3: To describe chromosome behaviour and changes in the chromosome structure

CO 4: Define and distinguish between population and sample

CO5: Compute a sample mean, variance and standard deviation

CO6: To describe the contents and properties of the most important bioinformatics database

Genetics

UNIT I:

Mendelian principles: Dominance, Monohybrid and dihybrid cross, Mendel's law of inheritance, ron Mendelian principle.Concepts of Gene: Allele, multiple alleles, Pseudoallele, Complementat on tests.Multiple factors: Skin colour in Human beings.

UNIT II:

Structural and numerical alterations of Chromosomes: Deletion, Duplication, Inversion, Translocation, Ploidy and their genetic implications.Sex linkage in Man, Sex determination, Environmental, Hormonal control of sex determinations.Linkage and crossing over in Drosophila.

UNIT III:

Human genetics : Pedigree analysis,symbols used in Pedigree analysis.Eugenics (positive and negative), Genetic counselling.Human Genome Project.Human chromosome – Normal Human karyotype, inherited disorders – Allosomal and Autosomal types.

Biostatistics

<u>Unit – IV</u>

Collection of data - Primary and Secondary data.Classification and tabulation of data, Diagrammatic and graphic representations.Measures of central tendency – Mean, Median and Mode – Individual, discrete and continuous series,

<u>Unit – V</u>

Measures of dispersion – Range, Standard deviation, Standard error, Variance, Quartile deviation. Rank correlation. Regression - types and equation.Binomialdispersion.Probability – addition theorem – simple problems.Chi – square test and student- T- test.

Text Books and References:

Genetics – Verma&Agarwal ;Genetics – K.Gupta.;Principles of Genetics – Eldon Jhon Gardener. Theory and problems of Genetics – W.D.Stansfield

Principles of Genetics – Robert H. Tamarin ;Genetics – Monroe W.Stick Berger.

Biostatistics- Kathambarajan; Statistics- Pillay&Bagavathy.Biostatistics- Palanichamy, Biostatistics- Arumugam.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : III	Course Code:17UZYE51	
Semester: V	Hours:5	
Course Category:Elective –I	Credits:5	

MICROBIOLOGY

Course outcomes:

CO1: Demonstrate safe practices in a microbiology laboratory.

CO2: Explain and correctly demonstrate use of the scientific method

CO3: Demonstrate proper usage, identify the parts/functions of the following microscopes: Brightfield and stereoscopic.

CO4: Transfer living microbes using aseptic technique.

CO5: Demonstrate proficiency and use of the following in the laboratory: streak plate isolation technique; bacterial staining techniques; wet mounts; and proper culture handling.

CO6: Visually recognize and explain the macroscopic and microscopic characteristics of fungi, protozoa, and bacteria

CO7: Understand and explain environmental factors that influence microbes.

CO8: Properly obtain, culture, identify, and explain microorganisms in environmental cultures

Unit- I:BasicMicrobiology

Definition for Microbiology, History of Microbiology & its Scope.Classification of Microorganisms, Different morphological appearances of Bacteria.Structure of a typical prokaryotic bacterium (E.coli) and its cell components.Structure of a typical T_4 Bacteriophage and its Life cycle.

Unit- II: Microbial culture techniques

Media and its types.Preparation of Nutrient Agar Plates.Broth culture, Stab culture, Slant culture.Autoclave- sterilization.Aseptic transfer, Inoculation, Spread plate, Streak plate- types, pour plate, serial dilution.Gram staining technique, Bacterial growth curve.

Unit- III: Medical Microbiology

Types of diseases (Air borne, water borne, Vector borne).Nosocomial infections.Bacterial disease – Tuberculosis &Gonorrhoea-, Disease diagnosis, mode of transmission, epidemiology, eradication methods.Viral disease – AIDS, Dengue -, Disease diagnosis, mode of transmission, epidemiology, eradication methods.

Unit- IV:Food Microbiology

Definition- Food spoilage and its biochemical changes.FoodPoisoning.Food preservation- methods.

Unit- V:Agricultural Microbiology

Nitrogen fixing organism- mechanism of N_2 fixation in the root nodules of Leguminous plants(Groundnut)Blue Green Algae (BGA)/ Cyanobacteria- non symbiosis- Azospirillum, Azotobacter.Mycorrhizae – types.

Text books:

- 1. A text book of Microbiology, 1995, Chakaraborty. P.New central book agency Ltd., Calcutta.
- 2. Ananthanarayanan, R., and C.K. JayaramPaniker, 1994: Text book of Microbiology, v Edition, Orient Longman.

References

- 1. Adams. M.R. and Moses, M.D.1995. Food Microbiology, New age Int. Ltd
- 2. Microbiology- Prescott. L. Harley. And Klein, 2004 :Wmc Brown McGraw Hill Publications.
- 3. Microbiology-Pelczar,JR
- 4. Medical Microbiology- Park & Park

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : III	Course Code:17UZYE52	
Semester: V	Hours:5	
Course Category: Part –IV-Elective -II	Credits:5	

COMPUTER APPLICATIONS AND INFORMATION TECHNOLOGY

Course outcomes:

CO1: To demonstrate the Basic knowledge of computer.

CO2: To explain input & output devices

CO3: To provide basic understanding of the fundamental processes of email.

Unit – I

Introduction to Computer – Block diagram.

Characteristics of Computer.

Generation and classification of Computer.

Unit – II

Computer and communication: Type - needs - Communication media - Network topologies.

Unit – III

MS word: File Operations: New, Open, Save, & Print. Editing: Cut, Copy, Paste, Find& Replace.

Insert: Page numbers & Pictures.

Unit IV

MS word: Format: Font, Bullet & Numbering, Paragraph& Background. Tools: Spelling &

Grammar. Data: Sort.

Unit – V

Internet: Internet concept - Types of internet connection- Internet services - Browsing techniques

- Websites - Email - Applications of Internet.

Text Books:

Biostatistics and Computer application, Arumugam N. (2005) Saras publications, Kottar, Nagercoil.

References:

- 1. Computer application in Business I. VasanthiRamanathan Meenakshipathippagam, Madurai 20.
- 2. Fundamentals of Computer, V. Rajaraman.
- 3. Fundamentals of Information Technology, PragathiPrakasam, Meerut.
- 4. MS: OFFICE fornWin 95 Microsoft office Press.
- 5. Developing Application with MS: OFFICE Christine Solomon Microsoft Office Press.

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)		
Year : III	Course Code:17UZYC6P	
Semester: V	Hours:2	
Course Category: Part –III-CorePractical -III	Credits:	

BIOCHEMISTRY, ECOLOGY, GENETICS , BIOSTATISTICS&MOLECULAR BIOLOGY Course outcomes:

CO1:To develop industrial processes for production of antibiotics, enzymes etc.

CO2:To develop gene surgery and gene therapy to cure genetic disease.

CO3:To create immproved varieties of plants and animals through genetic engineering and plant breeding.

CO4:To develop techniques for tissue culture,cell culture and organ transplantation CO5:To develop bioenergy

CO6:To develop biological processes of waste treatment to reduce the impact of pollution CO7:To develop biological process of plant disease control.

Biochemistry:

1. Estimation of Carbohydrate– Anthrone method

2.Estimation of lipid - Saponification number

3. Estimation of Protein - Lowry's method

4. Estimation of Haemoglobin

5.Enumeration of RBC, WBC Instrumentation: Principle and uses of a) pH meter, b)

Electrophoresis – Paper Electrophoresis, c) Chromatography – Paper Chromatography,

d) Colorimeter e) Centrifuges

Ecology:

- 1. Estimation of Dissolved Oxygen in water samples.
- 2. Plankton mounting- Fresh water and marine planktons,
- 3. Study of abiotic factors in aquatic environment Dissolved oxygen, pH and turbidity.
- 4. Examples illustrating animal association.
- 5. Food chain and food web in a pond Ecosystem.
- 6. Adaptations: a) Parasitic adaptations' Ascaris, Taeniasolium and Sacculina, b) Flight adaptations Birds and bat, c) Aquatic adaptations (Model or proper cuttings), d) Burrowing adaptations Rat/Pangolin.

GENETICS & MOLECULAR BIOLOGY

- 1. Simple Mendelian traits in man.
- 2. Blood Grouping- A, B, AB, O& Rh.

- 3. Study of Drosophila Culture and isolation of Virgin flies.
- 4. Mounting of Barr body.
- 5. Polygenic inheritance.

Models

- 6. DNA, RNA & Protein synthesis. Charts
- 7. Pedigree Analysis.
- 8. Conjugation, Transformation and Transduction.

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)		
Year : III	Course Code:17UZYC6Q	
Semester: V	Hours:3	
Course Category: Part –III-Core-Practical -IV	Credits:5	

MICROBIOLOGY, PHYSIOLOGY, BIOTECHNOLOGY & EVOLUTION

Course outcomes:

CO1: Demonstrate safe practices in a microbiology laboratory.

CO2: Explain and correctly demonstrate use of the scientific method

CO3: Demonstrate proper usage, identify the parts/functions of the following microscopes: Brightfield and stereoscopic.

CO4: Transfer living microbes using aseptic technique.

CO5: Demonstrate proficiency and use of the following in the laboratory: streak plate isolation technique; bacterial staining techniques; wet mounts; and proper culture handling.

MICROBIOLOGY

- 1.Lab Safety and Aseptic Techniques.
- 2.Gram staining- Capsular staining, flagellar staining.
- 3.Isolation of bacteria from pickles/ ice creams/ (Streak plate, Spread plate, Pour plate, serial dilution methods.
- 4. Visualisation of Bacterial Motility using Hanging Drop Method
- 5. Microbial Gas production using Durham's tube
- 6.Measurement of Bacterial cell using stage & Ocular micrometer.

Physiology:

- 1. Amylase activity in human saliva in relation to pH and Temperature.
- 2. Estimation of dissolved oxygen in different water samples.
- 3. Human blood grouping Demonstration only.
- 4. Qualitative analysis of nitrogenous waste products in fish tank water, bird excreta & mammalian urine.
- 5. Blood pressure demonstration under normal condition and stress.

Biotechnology:

6. Demonstration of P.C.R technique and Southern blot (Demo through CD) **Evolution:**

- 7. Homologous and Analogous organs.
- 8. Vestigial organs.
- 9. Fossils.
- 10. Examples of evolutionary importance Peripatus and Limulus.
- 11. Animals with adaptive colouration Leaf insect, Stick insect and Chaemeleon.
- 12. Variation Finger prints.

Study Tour:

Study tour to a minimum of 3 days duration, to be conducted compulsorily, Exposing students to different habit / habitat like forest, pollution area, wildlife sanctuaries, Zoo, aquarium, Marine habitat, Bird sanctuaries, Museums, Snake parks, Crocodile park, Genetic clinics, Biotechnology industries, Vermiculture farms etc., and submit a Tour report.

References

Any Laboratory Manual in Genetics & Molecular Biology Any Laboratory Manual in Microbiology

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : III	Course Code:17UBYA31
Semester: V	Hours:4
Course Category: Part –III-Allied-III	Credits:4

Taxonomy of Angiosperms, Economic botany Embryology, Horticulture and Medicinal plant.

Course Outcomes:

1.To have a knowledge of different families of Angiosperms

- 2.To know the value of economic botany
- 3.To know the structure of Anther and Ovule
- 4.To know the values of medicinal plants
- 5.To gain the knowledge of Horticulture

<u>Unit – IStudy of the following families.</u>

- 1. Caesal pinaceae
- 2. Asclepiadaceae
- 3. Euphorbiaceae
- 4. Poaceae

Unit -II Economic botany

- a) Cereals -Rice
- b) Pulses Blackgram
- c) Oilseed –Sunflower
- d) Spices-Pepper

<u> Unit – III Medicinal plants</u>

Neem –Meliaceae- Azadirachta indicaGinger –Zingiberaceae – Zingiber officinalePhyllanthus – Euphorbiaceae – Phyllanthus niruriOcimum -Lamiaceae -Ocimum sanctum

<u> Unit – IVEmbryology</u>

- 1. Structure and development of Anther
- 2. Structure and types of ovule
- 3. Development of female gametophyte Polygonum type
- 4. Structure of Dicot embryo

<u>Unit –V Horticulture</u>

- 1. Vegetative propagation
 - a. Cutting
 - b. Layering
 - c. Grafting
- 2. Planning and layout of orchards.
- 3. Kitchen gardening Layout, Choice of plants and importance.
- 4. Storage of fruits.

Reference Books

- 1000 Families of flowering plants –Michael Cambridge university press -1988
- 2. Flora of Presidency of MadrasJ.S.Gamble 3 volumes.
- 3. Economic Botany B.P.Pandey, S.chand & co -1984
- 4. A text Book of Embryology of Angiosperms Maheswari -Bojwani and Bhatnagar
- 5. Outlines of Botany R.V.Narayanaswami.-S.viswanathan (P) Ltd -1976
- 6. Horticulture Kumar.N Rajalakshmi publications Nagerkoil 2000
- 7. Economic Botany Hill –McGRAW –Hill book company -1951
- 8. Meedicinal plants -P.C Trivedi -I.K. International -2005
- 9. Application of botany in Horticulture -Andrew Genin .Oxford &IBH -2005
- 10. College botany Vol I & vol II -Ganguley & Kar
- 11. Economic botany -Sambamurthy and Subramaniam. Wiley Eastern Ltd

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : III	Course Code:17UBYA4P
Semester: V	Hours:2
Course Category: Part –III-Allied Practical-II	Credits:

Taxonomy of angiosperms, Embryology, Horticulture Medicinal Plants, Plant physiology and Applied Botany.

Course Outcomes:

1.To have a knowledge of different families of Angiosperms

- 2.To know the value of economic botany
- 3.To know the structure of Anther and Ovule
- 4.To know the values of medicinal plants
- 5. To gain the knowledge of Horticulture
 - 1. To describe plants in technical terms.
 - 2. Identification of Anther and Ovule.
 - 3. Propagation methods. Cutting, Layering and Grafting.
 - 4. Physiology set up. (Evolution of O₂ Ganong's Potometer, Mohl's half leaf expt)
 - 5. Spotters of Mushroom Cultivation, Biodiesel, Conventional and Non-conventional energy'.
 - 6. Observation and Record Note
 - 7. Herbarium Ten plants
 - 8. A study tour to collect plants.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : III	Course Code:17UZYS51
Semester: V	Hours:3
Course Category: Part –IV-Skill -III	Credits:2

IMMUNOLOGY

Course outcomes:

CO1: Understand the overall organization of the immune system

CO2: An understanding of humoral and cellular immunity and their relative significances to transfusion science theory and practice.

CO3: An understanding of the characteristics of antigens and antibodies.

CO4: An understanding of the nature of antigen-antibody reactions.

CO5: An appreciation of the importance of immunology as a foundation of transfusion medicine theory and practice.

Unit- I: Introduction to Immunology

Introduction, Primary& secondary lymphoid Organs(Thymus, Spleen)

Unit- II:

Antigens: Haptens, Epitopes, Paratope.Antibodies: Structure & functions of IgG

Unit- III:

Antigen- Antibody reactions: Immune complex, Avidity, Precipitation, agglutination.

Unit- IV:

Hypersensitivity- types i. Antibody dependent Hypersensitivity ii. Cytotoxic Hypersensitivity alone.Autoimmune Disease- Rheumatoid arthritis, HaemolyticAnaemia.

Unit- V:

Vaccines- Types- Inactivated & Attenuated , Immunization- Active & Passive.

Text book&References

- 1. Essentials of Immunology, Roitt, I.M. (2000) Blackwell Scientific Publishers.
- 2. Immunology Kuby, J.(1999) W.H.Freeman and company, New York.
- Immunology Roiff, J.M., Brosthoff J., D.K.Male. 1997, Mobby International Ltd., W.H.Freeman and company, New York.
- 4. Text Book of Immunology, Dulsi Fatima, Armugam, N.A.(2008) Saras publication, Kottar.

ENVIRONMENTAL STUDIES

Programme : B.A. History Semester : V Course Code : 17UEVS51 Part : IV EVS Hours : 2 Credits: 2

Course Outcomes:

CO1: Explain the knowledge about the Environmental Challenges.

CO2: Identify the various layers of the Atmosphere.

CO3: Create an awareness about Environmental studies and the effects of pollutions.

<u>UNIT – I</u>

Definition – Nature and Scope of Environmental Studies – its Needs.

<u>UNIT – II</u>

Natural Resources – Renewable and Non–Renewable Resources – Forest – Water – Mineral – food – Energy and Land Resources.

<u>UNIT – III</u>

Bio - Diversity and Eco-System- Producers, Consumers and Decomposers - Value of Bio -

Diversity – Conservation of Bio–Diversity – Inclusive and Exclusive Conservation.

$\underline{UNIT} - IV$

Environmental Pollution- Air, Water, Soil, Marine, Noise, Thermal and Nuclear Pollutions.

<u>UNIT – V</u>

Global Warming – Environmental Protection Acts – Role of Individuals in the Venture of Protection of Environment- Nuclear Issues.

Books for Study:

- William,P. Cunningham & Principles of Environmental Sciences Mary Ann Cunningham
 Dr. Sharma, J.P. - Comprehensive Environmental Studies.
 Drach Bharucha - Text book of Environmental Studies.
- 4. Manoharachamy, C and Jayarama Reddy, P. Principles of Environmental Studies.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : III	Course Code:17UZYC61
Semester: VI	Hours:6
Course Category: Part –III-Core-X	Credits:6

BIOCHEMISTRY & BIOTECHNOLOGY

Course outcomes:

CO1:To develop industrial processes for production of antibiotics, enzymes etc.

CO2: To develop gene surgery and gene therapy to cure genetic disease.

CO3:To create immproved varieties of plants and animals through genetic engineering and plant breeding.

CO4:To develop techniques for tissue culture, cell culture and organ transplantation CO5:To develop bioenergy

CO6:To develop biological processes of waste treatment to reduce the impact of pollution CO7:To develop biological process of plant disease control.

Unit – I

Carbohydrate: Outline classification – Structure of Monosaccharide (Glucose), Disaccharide (Sucrose) and Polysaccharide(Starch), Protein: Structure and classification.

Unit – II

Lipid: Structure and classification.Vitamins: structure and function of Fat and Water soluble vitamins.

Unit- III: Basic Biotechnology

Scope and Branches of Biotechnology.Recombinant DNA (rDNA) Technology- Human insulin Gene as example.Tools in genetic engineering- Enzymes, Cloning vectors & hosts. Polymerase chain reaction (PCR), Blotting techniques- Southern& Northern blots.DNA finger printing and its uses.rDNA Proteins – Interferon, Interleukin, Urokinase; Biofuels- Definition, Production of Biogas and its uses. Single cell Protein-Spirulina mass culture (SCP) -Commercial production of penicillin & Recombinant vaccines- types.

Unit- IV:

Cloning of Animals- methods and its uses.Transgenic Animals- Fish & Sheep, Ethical implications.Hybridoma Technology- Production and application of Monoclonal AntibodiesMCA/ Mabs.Human genome project(HGP).Plant tissue culture (PTC) Definition, methods and uses.Protoplast fusion-methods and uses.Transgenic Plants- Physical methods- Microinjection & Electroporation.

Unit- V:

Biodegradation – Definition- Xenobiotics- Biodegrading agents- treatment of toxic pollutants and its advantages. *Psedomonasputida*- Super Bug. Fermentation technology- fermenter design, types, principle, process & downstreaming.

Text Book:

1. Principles of Gene Manipulation, Primerose, S.B., R.Y.Twyman., and R.W.Old.,2001, Blackwell Scientific Pub., London.

Reference Books

- 1. Biotechnology, Dubey, R.C.1995, S.Chand& co., Newdelhi
- 2. Gene cloning and DNA Analysis, T.A.Brown.,(2005) IV Edition, Blackwell Scientific Pub.,London.
- 3. A text book of Biotechnology –U.Sathyanarayana.,U.Chakrapani., Publishers Arunnabhasen books and allied (P) Lro.8/1 chintamoni Das Lane Kolkata 70000; Revised edition 2006.
- A text book of Biotechnology Dulsy Fatima, I.M., Narayanan, R.P., Meyyan, K.Nallasingam, S.Prasanna Kumar, N. Armugam 2014 Saras Publication, Periavilai, Kottar post, Nagercoil, Tamilnadu.
- 5. Principles of Biochemistry, Lenninger, (2001) Nelson & co., CBS Publishers, New Delhi
- 6. Text book of Physiology and Biochemistry, Bell, Davidson and Scarborough, (2005) Livingstone.
- 7. Biochemistry, AmbikaShanmugam., (2007) west CIT Nagar, Chennai.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)		
Year : III	Course Code: 17UZYE61	
Semester: VI	Hours:6	
Course Category: Part –III-Elective -III	Credits:6	

PHYSIOLOGY AND EVOLUTION

Course outcomes:

CO1: To demonstrate the molecular & functional organization of a cell

CO2: To explain biochemical basis of inherited disorders

CO3:To provide basic understanding of the fundamental processes and mechanism that serve and control the various functions of the body

CO4:To study about the simple cellular mechanism as well as more complex interactions between whole organ system

CO5: Charles Darwin and his contribution to the theory of evolution

CO6: Define natural selection and how it relates to evolution

CO7 : The relationship between natural selection and evolution

Unit –I

Digestion: Physicochemical process of digestion and absorption of Carbohydrate, Proteins and Lipids.Circulation: Mechanism of Heart beat, Pace makers, ECG, Blood pressure and Blood coagulation.Respiration: respiratory pigments – transport of Oxygen and carbon di oxide – Respiratory Quotient – Mechanism of pulmonary respiration.Excretion: Structure of nephron and formation of Urine.

Unit II

Muscle physiology: Ultra structure of muscle.Nerve physiology: Ultra structure of neuron – physiology of nerve coordination.Reflex Action: definition of vision and hearing in man.

Osmoregulation in crustaceans and teleost fish. Thermoregulation: Poiklotherms and Homeotherms.

Hormonal function: Pituitary, Thyroid, Parathyroid, adrenal, Islets of Langerhans and testes and Ovary.Chronobiology: characteristics of Circadian rhythm – examples.

Unit – III

Theories of origin of life(Abiogenesis and Biogenesis).

Evidences - morphological, Embryological, Biochemical and Paleontological evidences.

Lamarckism and Neo – Lamarckism.

Darwin voyage to Galapagos island.

Darwinism and Neo – Darwinism.

Supplementary theories of Darwin.

Mutation and modern mutation theory.

Modern synthetic theory

Unit – IV

Micro and Macroevolution – Elementary forces and Mechanism with example.

Adaptive colouration, Mimicry – Betasian and Mullerian types, Co-evolution.

Convergent and Divergent evolution.

Parallel evolution and adaptive radiation.

Unit – V

Fossils; Types, methods of Fossilization, methods of dating fossils, geological time table Horse evolution – Trends, fossil records, orthogenesis Human evolution _ Fossil records, cultural evolution and future evolution of Man

Text and reference Books:

Animal Function – Principles and adaptations. Gordon, S.Maleon, et.al., The Macmillan company. General Comparative Physiology, Hoar, S.William – (2004) Prentice Hall of Indian Pvt Ltd, New Delhi. Organic Evolution, Rastogi, V.B., (2003) KedarNath and Ram Nath, Meerat.

Process of Organic evolution, Stabbins Animal Species and Evolution, Mayr,E An Introduction of Evolution, Moody, P.A., KalyaniPublisghers, Ludhiana. Major features of Evolution, simpson, G.G The Vertebrate story, Romer., A.S. Evolution, Dobzhansky, Ayala, stebbin and Valentine

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : III	Course Code:17UZYE62
Semester: VI	Hours:3
Course Category: Part –III-Elective-IV	Credits:5

COMMERCIAL ZOOLOGY

Course outcomes:

CO1: To demonstrate the basic culture techniquesCO2: To explain the mechanism of marketing strategy.CO2: To reveal thelatest techniques on post harvesting techniques.

Unit- 1: Dairy Farming

Introduction to dairy farming, Live stocks in India (Jersey, Buffaloes, Goat-Murrah. Jamunapari, Management of Model dairy farm, Livestock disease(FMD, Udder)

Unit- 2: Apiculture

Definition: Species of Honey bees, SocialOrganisation.- Newton's Bee Hive, Location of Apiary-Honey extraction

Unit- 3: Sericulture

Definition: Species of Silk worms, Moriculture in general, Biology of Silkworm-Uses.

Unit- 4: Vermiculture

Definition: Species of Earthworms(Epigeic, Endogeic&Anaecic worms),Construction of Model Vermiculture Unit, Vermicomposting, Vermiwash - Uses

Unit- 5: Poultry Science

Definition: Modern Poultry House, Practical Aspects of Chick rearing, Vaccination Programme.

Text books:

- 1. Manual of Fresh water Aquaculture, Santhanam. R, Sukumaran.N and Natarajan.P, Oxford and IBH Publishing Co Pvt Ltd., New Delhi 1990.
- 2. A Text Book of Invertebrates, Armugam, N.A.(2008) Saras publication, Kottar.
- 3. The Earthworm Book, Sulthan Ahmed Ismail (2005) other India press.
- 4. Modern aspects of commercial Poultry Keeping: M.R. Gnanamani(1978), Giri Publication, Nagamalai, Madurai.

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : III	Course Code:17UZYC6P
Semester: VI	Hours:3
Course Category: Part –III-Core-Practical –III	Credits:5

BIOCHEMISTRY, ECOLOGY, GENETICS & MOLECULAR BIOLOGY

Course outcomes:

CO1:To develop industrial processes for production of antibiotics, enzymes etc.

CO2: To develop gene surgery and gene therapy to cure genetic disease.

CO3:To develop techniques for tissue culture, cell culture and organ transplantation

CO4:To develop bioenergy

CO5:To develop biological processes of waste treatment to reduce the impact of pollution

CO6:To develop biological process of plant disease control.

Biochemistry:

1. Estimation of Carbohydrate- Anthrone method

2.Estimation of lipid - Saponification number

3.Estimation of Protein – Lowry's method

4. Estimation of Haemoglobin

5.Enumeration of RBC, WBC Instrumentation: Principle and uses of a) pH meter, b) Electrophoresis – Paper Electrophoresis, c) Chromatography – Paper Chromatography, d) Colorimeter e) Centrifuges

Ecology:

- 7. Estimation of Dissolved Oxygen in water samples.
- 8. Plankton mounting- Fresh water and marine planktons,
- 9. Study of abiotic factors in aquatic environment Dissolved oxygen, pH and turbidity.
- 10. Examples illustrating animal association.
- 11. Food chain and food web in a pond Ecosystem.
- 12. Adaptations: a) Parasitic adaptations' Ascaris, Taeniasolium and Sacculina, b) Flight adaptations Birds and bat, c) Aquatic adaptations (Model or proper cuttings), d) Burrowing adaptations Rat/Pangolin.

GENETICS & MOLECULAR BIOLOGY

- 9. Simple Mendelian traits in man.
- 10. Blood Grouping- A, B, AB, O& Rh.
- 11. Study of Drosophila Culture and isolation of Virgin flies.
- 12. Mounting of Barr body.
- 13. Polygenic inheritance.

Models

14. DNA, RNA & Protein synthesis.

Charts

- 15. Pedigree Analysis.
- 16. Conjugation, Transformation and Transduction.

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : III	Course Code:17UZYC6Q
Semester: VI	Hours:3
Course Category: Part –III-Core Practical -IV	Credits:5

MICROBIOLOGY, PHYSIOLOGY, BIOTECHNOLOGY & EVOLUTION

Course outcomes:

CO1: To demonstrate the molecular & functional organization of a cell

CO2:To explain biochemical basis of inherited disorders

CO3:To provide basic understanding of the fundamental processes and mechanism that serve and control the various functions of the body

CO4:To study about the simple cellular mechanism as well as more complex interactions between whole organ system

CO5: Charles Darwin and his contribution to the theory of evolution

CO6: Define natural selection and how it relates to evolution

CO7 : The relationship between natural selection and evolution

MICROBIOLOGY :

1.Lab Safety and Aseptic Techniques.

2.Gram staining- Capsular staining, flagellar staining.

3.Isolation of bacteria from pickles/ ice creams/ (Streak plate, Spread plate, Pour plate, serial dilution methods.

4. Visualisation of Bacterial Motility using Hanging Drop Method

5. Microbial Gas production using Durham's tube

6.Measurement of Bacterial cell using stage & Ocular micrometer.

Physiology:

- 1. Amylase activity in human saliva in relation to pH and Temperature.
- 2. Estimation of dissolved oxygen in different water samples.
- 3. Human blood grouping Demonstration only.
- 4. Qualitative analysis of nitrogenous waste products in fish tank water, bird excreta & mammalian urine.
- 5. Blood pressure demonstration under normal condition and stress.

Biotechnology:

6. Demonstration of P.C.R technique and Southern blot (Demo through CD)

Evolution:

- 7. Homologous and Analogous organs.
- 8. Vestigial organs.
- 9. Fossils.
- 10. Examples of evolutionary importance Peripatus and Limulus.
- 11. Animals with adaptive colouration Leaf insect, Stick insect and Chaemeleon.
- 12. Variation Finger prints.

Study Tour:

Study tour to a minimum of 3 days duration, to be conducted compulsorily, Exposing students to different habit / habitat like forest, pollution area, wildlife sanctuaries, Zoo, aquarium, Marine habitat, Bird sanctuaries, Museums, Snake parks, Crocodile park, Genetic clinics, Biotechnology industries, Vermiculture farms etc., and submit a Tour report. References

Any Laboratory Manual in Genetics & Molecular Biology Any Laboratory Manual in Microbiology

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : III	Course Code:17UBYA41
Semester: VI	Hours:4
Course Category: Part –III-Allied-III	Credits:4

Plant Physiology, Forestry, Applied Botany, Environmental Biology, Biodiversity

Course Outcomes:

- 1.To understand the metabolic activities of plants
- 2.To gain knowledge in Applied botany
- 3.To create the awareness in environmental studies
- 4.To know the importance of biodiversity
- 5.To know the value of forests and its importance

<u>Unit – I</u>Plant Physiology

- 1. Transpiration Mechanism of transpiration
- 2. Photo synthesis- Light reaction and Dark reaction
- 3. Respiration Glycolysis and Kreb's cycle
- 4. Photoperiodidsm Short day, Long day, Day neutral plants

<u>Unit – II Forestry</u>

- 1.Conservation of the forests
- 2.Management of the forest
- 3 Methods of studying vegetation quadrat & Line transect
- 4. Wealth from forest

<u>Unit – III</u> Applied botany

- 1. Mushroom Cultivation- Nutritive Value, Spawn Preparation, masscultivation of OysterMushroom.
- 2. Biodiesel Production from Jatropha
- 3. Composting Indore- method Bangalore- method Vermicompost
- 4. Biogas cow dung

<u>Unit – IVEnvironmental Biology</u>

1. Pollution - Air Pollution, Water Pollution – Causes, effects and controlling measures.

2.Conventional energy-firewood, coal

3.Non - Conventional Energy. Wind energy, solar energy, wave energy.

4. Vegetational types of India

<u>Unit – VBiodiversity</u>

- 1. Types of Biodiversity.
- 2.Hots spots of Biodiversity
- 3.Conservation of Biodiversity
- 4.Importance of Biodiversity

Reference Books

- 1. Plant Physiology M.S. Tayal -K.Nath &co 2000
- 2. Text book of physiology -S.N. Panday and C.B.K.Sinha Vani publications -2006
- 3. Mushroom cultivation and uses B.C. Suman & Sharma
- 4. Biodiesel and Jatropha cultivation Satish lele Agrobios -2004
- 5. A Hand Book of Organic farming R.K.Sharma Agrobios -2004
- 6. Ecology E.P.Odum –saunders college publishing -Philadelphia
- 7. Biodiversity Krishnamoorthy. Oxford & IBH -2003
- 8. Text Book of EnvironmentalStudies –By Erach Bharucha
- 9. Biodiversity and conservation -By Gabriel Melchias
- 10. Forestry in India A.P.Dwivedi Jugal Kishor and company, 1980.
- 11. Forestry H.G. champion –Oxford university press -1954.
- 12. Forestry -D.N. Tewari- Jugal Kishore and company -1991
- 13. A text book of Botany -A.Muneswaran -Brighten book house -chennai 2001
- 14. Ecology P.S. Verma & V.K. Agarwal S, chand & co 2000
- 15. 15. Biodiversity Mahesh Prasad Singh APH publishing corporation 2009

DEPARTMENT OF ZOOLOGY (2017-2018Onwards)	
Year : III	Course Code:17UBYA4P
Semester: VI	Hours:2
Course Category: Part –III-Allied Practical-III	Credits:1

Taxonomy of angiosperms, Embryology, Horticulture Medicinal Plants, Plant physiology and Applied Botany.

Course outcomes:

1.To have a knowledge of different families of Angiosperms

- 2.To know the value of economic botany
- 3.To know the structure of Anther and Ovule
- 4.To know the values of medicinal plants
- 5.To gain the knowledge of Horticulture
 - 1. To describe plants in technical terms.
 - 2. Identification of Anther and Ovule.
 - 3. Propagation methods. Cutting, Layering andGrafting.
 - 4. Physiology set up. (Evolution of O₂ Ganong's Potometer, Mohl's half leaf expt)
 - 5. Spotters of Mushroom Cultivation, Biodiesel, Conventional and Non-conventional energy'.
 - 6. Observation and Record Note
 - 7. Herbarium Ten plants
 - 8. A study tour to collect plants.

DEPARTMENT OF ZOOLOGY (2017-2018 Onwards)	
Year : III	Course Code:17UZYS61
Semester: VI	Hours:2
Course Category: Part –IV-Skill-IV	Credits:3

ECONOMIC ENTOMOLOGY AND SERICULTURE TECHNOLOGY

Course outcomes:

CO 1: Gain a basic understanding of the balance of insects on the farm/garden (pests and beneficial insects)

CO2: Be able to identify a number of common pests and suggest methods of control.

CO3: Identify many beneficial and destructive insects and their close relatives.

CO4: Identify the class and order, type of metamorphosis, type of mouthparts, and understand common pest control strategies.

CO5: Motivating the farmers to plant high yielding mulberry varieties to increase income and productivity.

CO6: Imparting training in mulberry cultivation, silkworm rearing and silk reeling.

CO7: Assist in procurement of improved rearing equipment and construction of separate rearing house.

CO8: Ensure supply of disease free silkworm seeds.

Unit- I:Insect Growth

Salient features of In sects, Dominance of insects among animals, Economic classification of insects. Insect development and metamorphosis, larval and pupal types.

Unit- II:Beneficial Insects

Apiculture: Biology, production and uses. Sericulture: Biology, production and uses.

Unit- III:Helpful Insects

Scavengers, pollinators, predators and parasites effecting biological control.

Unit-IV:Pest Control

Physical, chemical, mechanical, biological and integrated control methods.

Unit- V:Medical Entomology

House hold insect pests and their control measures. Disease causing vectors – Housefly, mosquito, lice, Tsetse fly – Life cycle, disease transmitted and their control measures. **Text books**:

Text book of Economic Entomology, Vasantha Raj David.

Text book of Entomology, - M.S.Moni.

Hand book of Economic Entomology for South India - T.V. Ramakrishnan

VALUE EDUCATION

Year : III Semester : VI Course Code : 17UVED61 Part : IV Hours : 4 Credits: 2

Course Outcomes

CO1: Understand the important moral values in all walks of life.CO2: Evaluate the professional Ethics. .CO3: Explain the doctrine and values of different religions and its impacts.

UNIT I: VALUES AND THE INDIVIDUAL

Values- Meaning-the significance of values-classification of Values-need of Value Education-Values and the individual-self-discipline, self-confidence, self-initiative, Empathy, Compassion, Forgiveness, Honesty and Courage.

UNIT: II VALUES AND RELIGION

Karmayoga in Hinduism-Love and Justice and Christianity-Brotherhood in Islam-Compassion in Buddhism-Ahimsa in Jainism and Courage in Sikhism-Need for Religious Harmony.

UNIT :III VALUES AND SOCIETY

Definition of Society- Democracy- Secularism –Socialism-Gender Justice-Human Rights-Socio- Political Awareness-Social Integration-Social Justice.

UNIT: IV PROFESSIONAL VALUES

Definition-Accountability-Willingness to learn- Team Spirit- Competence development-Honesty-Transparency-Respecting others-Democratic functioning-Integrity and Commitment.

UNIT: V.ROLE OF SOCIAL INSTITUTIONS IN VALUE FORMATION

Role of Family-Peer Group-Society-Eduational Institutions- Role Models and Mass Media in Value formation.

Books for Study:

Values in Education.
eace and Value Education: A creative response to
onsumerism and communalism.
Personality.
Quest For Harmony: An Anthology of Religions In Dialogue.