

# PONDICHERRY UNIVERSITY

(A CENTRAL UNIVERSITY)



## **B.Sc. ZOOLOGY**

(Choice Based Credit System)

Regulations & Syllabus

2017-18 onwards

## **THE UNDER GRADUATE COURSE IN ZOOLOGY**

### **AIM AND SCOPE OF THE COURSE:**

To acquire knowledge across different areas of animal science and understand the importance of animals in the biosphere.

Provides an opportunity to familiarize with the functional anatomy and mode of reproduction in different animal groups.

The topics included in different units of respective paper would enable the students to develop technical skills in Zoological and allied branches.

Skill based subjects like Vermitechnology, Clinical Laboratory Technology, Apiculture and Aquatic Biology included in order to Promote their Skill and Provide employable opportunities in the field of higher studies and research in Government and Private organizations

There is also scope for self-employment for the students.

Practicals included in the syllabus will improve the skills of students in microscopy, observation, drawing and laboratory techniques.

### **ELIGIBILITY FOR ADMISSION:**

Candidate for admission to the first year of the degree of Bachelor of Science in Zoology Course shall be required to have passed the Higher Secondary Examination(10+2) (Academic – Pure science and Biology ) conducted by ICSE/CBSE/ any state Govt. Board or equivalent recognized by Pondicherry University.

### **DURATION OF THE COURSE:**

The Course for the degree of Bachelor of Science in Zoology shall consist of three academic years divided into six semesters.

Each semester consists of 90 working days.

### **PASSING MINIMUM:**

The candidate shall be declared to have passed the examination if he/she secures not less than 40 percent of Mark.



**SCHEME FOR CHOICE BASED CREDIT SYSTEM IN  
B.Sc. PROGRAMME  
To be implemented from 2017 -18 onwards**

COURSE	SUBJECT CODE	TITLE OF THE PAPER	CREDITS ALLOTTED	
			LECTURE	LAB/ TUTORIAL
SEMESTER –I		20 Credits		
MIL - 1	LTAM/LFRE/LMAL/ LTEL/LHIN 111		03	
ENGLISH -1	ENGL 112		03	
DSC-1A	UZOC 111	Biodiversity of Invertebrates	04	
	UZOP 114	Biodiversity of Invertebrates- Practical	--	02
DSC-2A	UZOC 112	Basic Zoology	04	
	UZOP 115	Basic Zoology Practical	--	02
AECC - 1	PADM 113		02	
SEMESTER –II		20 Credits		
MIL - 2	LTAM/LFRE/LMAL/ LTEL/LHIN 121		03	
ENGLISH -1	ENGL 122		03	
DSC-1B	UZOC 121	Biodiversity of Chordates and Vertebrates	04	
	UZOP 124	Biodiversity of Chordates and Vertebrates Practical		02
DSC-2B	UZOC122	Animals and Human Welfare	04	
	UZOP 125	Animals and Human Welfare Practical		02
AECC - 2	ENVS 123		02	
SEMESTER –III		20 Credits		
MIL - 3	LTAM/LFRE/LMAL/ LTEL/LHIN 231		03	
ENGLISH -3	ENGL 232		03	
DSC-1C	UZOC 231	Animal Physiology	04	
	UZOP 234	Animal Physiology Practical	--	02
DSC-2C	UZOC 232	Microbiology	04	
	UZOP 235	Microbiology Practical	--	02
SEC - 1	UZOS 233	Vermitechnology	02	
SEMESTER –IV		20 Credits		
MIL - 4	LTAM/LFRE/LMAL/ LTEL/LHIN 241		03	
ENGLISH - 4	ENGL 242		03	
DSC-1D	UZOC 241	Developmental Biology	04	
	UZOP 244	Developmental Biology		02

		Practical		
DSC-2D	UZOC 242	Vector Biology	04	
	UZOP 245	Vector Biology Practical		02
SEC - 2	UZOS 243	Clinical Laboratory Technology	02	
SEMESTER –V		20 Credits		
SEC-3	UZOS 351	Apiculture	02	
DSE – 1A	UZOE 352	Immunology	04	
	UZOP 358	Practical		01
	UZOE 353	Ornamental Fish Culture and Aquarium Technology	04	
	UZOP 358	Practical		01
DSE – 2A	UZOE 354	Cell and Molecular Biology	04	
	UZOP 358	Practical		01
DSE – 3A	UZOE 355	Biochemistry and Intermediary Metabolism	04	
	UZOP 358	Practical		01
	UZOE 356	Bioinstrumentation	04	
	UZOP 358	Practical		01
GE - 1	UZOG 357	Public Health and Hygiene	03	
SEMESTER –VI		20 Credits		
SEC-4	UZOS 361	Aquatic biology and Culture Techniques	02	
DSE – 1A	UZOE 362	Endocrinology and Reproductive Biology	04	
	UZOP 368	Practical		01
	UZOE 363	Poultry and Dairy Science	04	
	UZOP 368	Practical		01
DSE – 2A	UZOE 364	Evolution and Conservation Biology	04	
	UZOP 368	Practical		01
DSE – 3A	UZOE 365	Genetics and Biotechnology	04	
	UZOP 368	Practical		01
	UZOE 366	Biostatistics and Bioinformatics	04	
	UZOP 368	Practical		01
GE - 2	UZOG 367	Value Added Products of Animals	03	

## **DETAILS OF THE SUBJECTS FOR B.Sc. ZOOLOGY COURSE**

### **I. DSC – DISCIPLINE SPECIFIC CORE ( DSC-1A, DSC-1B, DSC-1C & DSC-1D)**

(for Zoology Main Students)

#### **Compulsory Subjects ( Four papers)**

1. Biodiversity of Invertebrates - ( DSC-1A)
2. Biodiversity of Chordates and Vertebrates - ( DSC-1B)
3. Animal Physiology -- (DSC-1C)
4. Developmental Biology -- (DSC- 1D)

### **DSC - DISCIPLINE SPECIFIC CORE (DSC-2A & DSC-2B)**

(for Botany and Chemistry Main Students)

#### **( Two Papers)**

1. Basic Zoology - (DSC-2A)
2. Animals and Human Welfare - (DSC-2B)

### **DSC - DISCIPLINE SPECIFIC CORE (DSC-2C & DSC-2D)**

(for Non – Zoology Students)

#### **( Two Papers)**

1. Microbiology -- (DSC-2C)
2. Vector Biology—(DSC- 2D)

### **II. SEC- SKILL ENHANCEMENT COURSES ( SEC-1, SEC-2, SEC- 3 & SEC-4)**

(for Zoology Main Students)

#### **( Four papers)**

1. Vermitechnology – ( SEC-1)
2. Clinical Laboratory Technology – (SEC-2)
3. Apiculture --- (SEC-3)
4. Aquatic biology and Culture Techniques ---- (SEC-4)

### **III. DSE - DISCIPLINE SPECIFIC ELECTIVES**

#### **DSE - Fifth Semester (DSE-1)**

For Zoology Main Students ( any one paper)

1. Immunology
2. Ornamental Fish Culture and Aquarium Technology

#### **DSE - Sixth Semester ( DSE-1)**

For Zoology Main Students ( any one paper)

1. Endocrinology and Reproductive Biology
2. Poultry and Dairy Science

#### **DSE - Fifth Semester (DSE-2 & DSE-3)**

For Zoology and other Science Students ( any two paper)

1. Biochemistry and Intermediary Metabolism
2. Cell and Molecular Biology
3. Bioinstrumentation

#### **DSE - Sixth Semester (DSE-2 & DSE-3)**

For Zoology and other Science Students ( any two paper)

1. Genetics and Biotechnology
2. Evolution and Conservation Biology
3. Biostatistics and Bioinformatics

### **IV. GE - GENERIC ELECTIVE ( GE-1 & GE-2)**

For Non Zoology Students

1. Public Health and Hygiene - (GE 1)
- 2.. Value Added Products of Animals –( GE 2)

### **V. MIL- MODERN INDIAN LANGUAGES -- ( MIL-1,MIL-2,MIL-3 & MIL-4)**

Arabic/Bengali/Hindi/Malayalam/Sanskrit/Tamil/Telugu

### **VI. ENGLISH -- ( ENGLISH-1,ENGLISH-2,ENGLISH-3 & ENGLISH -4)**

### **VII. AECC- ABILITY ENHANCEMENT COURSES (AECC-1 & AECC-2) ( Compulsory)**

1. Public Administration – (AECC-1)
2. Environmental Studies –(AECC-2)

**PONDICHERRY UNIVERSITY**  
**BACHELOR OF SCIENCE**  
**B.SC. ZOOLOGY – DEGREE COURSE**  
**CBCS PATTERN ( With effect from 2017-2018)**

**The Course of Study and the Scheme of Examinations**

S.No	Study Components Course Title		Ins. Hrs/ Week	Exam hours	Title of the Paper	Maximum Marks			Credit
						CIA	Univ. Exam	Total	
<b>SEMESTER-I</b>									
1	Language	Paper-1	6	3	Tamil/French/Malayalam/Telugu/Hindi	25	75	100	3
2	English	Paper-1	6	3	English	25	75	100	3
3	Core Theory	Paper-1	4	3	Biodiversity of Invertebrates	25	75	100	4
4	Core Practical	Practical-1	4	3	Biodiversity of Invertebrates Practical	15	35	50	2
5	Botany	Paper-1	4	3	Allied Botany - 1	25	75	100	4
6	Practical	Botany Practical-1	2	3	Allied Botany Practical -1	15	35	50	2
7	AECC- 1		4	3	Public Administration	25	75	100	2
			30			155	445	600	20



S.No	Study Components Course Title		Ins. Hrs/ Week	Exam hours	Title of the Paper	Maximum Marks			Credit
						CIA	Univ. Exam	Total	
<b>SEMESTER-II</b>									
8	Language	Paper-2	6	3	Tamil/French/Malayalam/Telugu/ Hindi	25	75	100	3
9	English	Paper-2	6	3	English	25	75	100	3
10	Core Theory	Paper-2	4	3	Biodiversity of Chordate and Vertebrates	25	75	100	4
11	Core Practical	Practical-2	4	3	Biodiversity of Chordate and Vertebrates Practical	15	35	50	2
12	Botany	Paper-2	4	3	Allied Botany -2	25	75	100	4
13	Practical	Botany Practical-2	2	3	Allied Botany Practical-2	15	35	50	2
14	AECC- 2		4	3	Environmental Studies	25	75	100	2
			30			155	445	600	20

S.No	Study Components Course Title		Ins. Hrs/ Week	Exam hours	Title of the Paper	Maximum Marks			Credit
						CIA	Univ. Exam	Total	
<b>SEMESTER-III</b>									
15	Language	Paper-3	6	3	Tamil/French/Malayalam/Telugu /Hindi	25	75	100	3
16	English	Paper-3	6	3	English	25	75	100	3
17	Core Theory	Paper-3	4	3	Animal Physiology	25	75	100	4
18	Core Practical	Practical-3	4	3	Animal Physiology Practical	15	35	50	2
19	Chemistry	Paper-1	4	3	Allied Chemistry -1	25	75	100	4
20	Practical		2	3	Allied Chemistry Practical-1	15	35	50	2
21	SEC -1	Paper-1	6	3	Vermitechnology	25	75	100	2
			30			155	445	600	20

S.No	Study Components Course Title		Ins. Hrs/ Week	Exam hours	Title of the Paper	Maximum Marks			Credit
						CIA	Univ. Exam	Total	
<b>SEMESTER-IV</b>									
22	Language	Paper-4	6	3	Tamil/French/Malayalam/Telugu /Hindi	25	75	100	3
23	English	Paper-4	6	3	English	25	75	100	3
24	Core Theory	Paper-4	4	3	Developmental Biology	25	75	100	4
25	Core Practical	Practical-4	4	3	Developmental Biology Practical	15	35	50	2
26	Chemistry	Paper-2	4	3	Allied Chemistry -2	25	75	100	4
27	Practical	Chemistry Practical-2	2	3	Allied Chemistry Practical.-2	15	35	50	2
28	SEC-2	Paper-2	4	3	Medical Laboratory Technology	25	75	100	2
			30			155	445	600	20

S.No	Study Components Course Title	Ins. Hrs/ Week	Exam hours	Title of the Paper	Maximum Marks			Credit	
					CIA	Univ. Exam	Total		
<b>SEMESTER-V</b>									
29	SEC-3	Paper-3	6	3	Apiculture	25	75	100	2
30	DSE-1	Paper-1	4	3	Immunology	25	75	100	4 *
31		Practical -5	2	3	Practical	15	35	50	1 *
32		Paper-2	4	3	Ornamental Fish Culture and Aquarium Technology	25	75	100	4 *
33		Practical -5	2	3	Practical	15	35	50	1 *
34	DSE-2	Paper-3	4	3	Cell and Molecular Biology	25	75	100	4 *
35		Practical -5	2	3	Practical	15	35	50	1 *
36	DSE-3	Paper-4	4	3	Biochemistry and Intermediary Metabolism	25	75	100	4 *
37		Practical -5	2	3	Practical	15	35	50	1 *
38		Paper-5	4	3	Bioinstrumentation	25	75	100	4 *
39		Practical -5	2	3	Practical	15	35	50	1 *
40	GE - 1	Paper-6	6	3	Public Health and Hygiene	25	75	100	3
			30			170	480	650	20

- Any Three subject

S.No	Study Components Course Title		Ins. Hrs/ Week	Exam hours	Title of the Paper	Maximum Marks			Credit
						CIA	Univ. Exam	Total	
<b>SEMESTER-VI</b>									
41	SEC-4	Paper-4	6	3	Aquatic biology and Culture Techniques	25	75	100	2
42	DSE-1	Paper-1	4	3	Endocrinology and Reproductive Biology	25	75	100	4*
43		Practical -6	2	3	Practical	15	35	50	1*
44		Paper-2	4	3	Poultry and Dairy Science	25	75	100	4*
45		Practical -6	2	3	Practical	15	35	50	1*
46	DSE-2	Paper-3	4	3	Evolution and Conservation Biology	25	75	100	4*
47		Practical -6	2	3	Practical	15	35	50	1*
48	DSE-3	Paper-4	4	3	Genetics and Biotechnology	25	75	100	4*
49		Practical -6	2	3	Practical	15	35	50	1*
50		Paper-5	4	3	Biostatistics and Bioinformatics	25	75	100	4*
51		Practical -6	2	3	Practical	15	35	50	1*
52	GE - 2	Paper-6	6	3	Value Added Products of Animals	25	75	100	3
			30			170	480	650	20

- Any Three subject

## FIRST SEMESTER

### Core Paper : BIODIVERSITY OF INVERTEBRATES

#### Paper Code : UZOC 111

- Objectives:
1. To understand Biodiversity, Habitat, Adaptation organization and taxonomic status of invertebrates.
  2. Explaining the basic aspects of classification, structural and functional details of Invertebrates.

#### Unit I:

Principles of Taxonomy – Binomial nomenclature – Rules of nomenclature – Whittaker's five kingdom concept and classification of Animal Kingdom..

**PROTOZOA:** General characters and classification up to classes with suitable examples of Indian context. Type study – *Paramecium*

**PORIFERA:** General characters and classification up to classes with suitable examples of Indian context. Type study – *Leucosolenia*

#### Unit II:

**COELENTERATA:** General characters and classification up to classes with suitable examples of Indian context. Type study – *Obelia*,

**CTENOPHORA:** Classification, Salient features with suitable examples of Indian context.

#### Unit III:

**PLATYHELMINTHES :** General characters and classification up to classes with suitable examples of Indian context. Type Study: *Taenia solium*

**ASCHELMINTHES:** General characters and classification up to classes with suitable examples of Indian context. Type study: *Ascaris lumbricoides*

#### Unit IV:

**ANNELIDA :** General characters and classification up to classes with suitable examples of Indian context. Type study; *Nereis*

**ARTHROPODA :** General characters and classification up to classes with suitable examples of Indian context. Type study; *Panaeus monodon*

**Unit V:**

**MOLLUSCA** : General characters and classification up to classes with suitable examples of Indian context. Type study; *Unio*

**ECHINODERMATA** : General characters and classification up to classes with suitable examples of Indian context. Type study; *Asterias*.

**Suggested Readings**

1. Kotpal, R. L., 2000, Modern Text Book of Zoology –Invertebrates, 8th Revised edition (Reprint), Rastogi Publications, Meerut – 250 002.
2. Ayyar, E.K. and T.N. Ananthkrishnan, 1992. Manual of Zoology Vol. 1 (Invertebrate), Part I & II. S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 991p.
3. Jordan, E.L. and P.S. Verma, 2010, Invertebrate Zoology, S. Chand & Co Ltd., Ram Nagar, New Delhi.
4. Hyman volume I to VI, 1955, McGraw Hill Co. New York.
5. Barnes R.D (1992) Invertebrate Zoology IV Edn. Holt saunders International Edn.

## FIRST SEMESTER

### Core Paper Practical - 1 : BIODIVERSITY OF INVERTEBRATES

Paper Code : UZOP 114

#### I. DISSECTION

##### A.. Prawn:

1. Digestive system
2. Nervous system

##### B. Cockroach

3. Digestive system
4. Nervous system
5. . Male Reproductive system
6. Female Reproductive system

#### II. MOUNTING

7. Earth worm- Body setae and Penial setae
8. Mouth parts of Mosquito
9. Sting apparatus of Honey bee
10. Prawn appendages:

#### III – SPOTTERS ( any 30 spotters)

##### A- Classify giving reasons up to order:

1. *Paramecium*
2. *Scypha*
3. *Aurelia*
4. *Fasciola*
5. *Ascaris*
6. *Neanthes*
7. *Panaeus*
8. *Lamellidens*
9. *Asterias*

##### B- Draw labeled sketches:

10. L.S. Sponge
11. *Obelia medusa*
12. *Physalia*
13. Ephyra larva
14. Redia larva
15. Cercaria larva
16. *Mysis* larva



17. *Alima* larva
18. *Bipinnaria* larva

**C- Comment on Biological significance:**

19. *Entamoeba*
20. *Paramecium* – Conjugation
21. *Plasmodium*
22. *Obelia* colony
23. *Velella*
24. *Fasciola* – Miracidium
25. *Taenia* – Mature proglottid
26. *Ascaris*
27. *Heteronereis*
28. Trochophore larva
29. *Chaetopterus*
30. *Peripatus*
31. *Hirudinaria*
32. *Limulus*
33. Nauplius larva
34. Zoea larva
35. *Chiton*
36. *Sepia*
37. *Octopus*
38. *Sacculina* on crab
39. Sea anemone on Hermit crab

**D – Relate structure and function:**

40. Sponge – Spicules
41. Sponge – Gemmule
42. *Taenia* – Scolex
43. *Neanthes* – Parapodium
44. Earth worm – Penial setae
45. *Panaeus* – Petasma
46. Honey bee – Sting apparatus
47. Scorpion – Book – lung
48. Starfish – Pedicellaria
49. Starfish - Tube foot.

## **SECOND SEMESTER**

**Core Paper : BIO DIVERSITY OF CHORDATES AND VERTEBRATES**

**Paper Code: UZOC 121**

Objectives : To discuss habitat, adaptations and organization of chordates.

### **UNIT – I**

Salient Features of Phylum Chordata.

#### **PROCHORDATA:**

Characteristics and classification of Prochordata upto order level with examples

Type study: Ascidia

General topic:. Origin of Chordata.

### **UNIT –II**

#### **PISCES**

General characters and classification up to orders with examples

Type study: Shark. ( without endoskeleton)

General Topic: Accessory respiratory organs in fishes,

#### **AMPHIBIA**

General characters and classification up to orders with examples

Type study: Frog ( without endoskeleton)

General Topic: Parental care in Amphibians

### **UNIT – III**

#### **REPTILIA**

General characters and classification up to orders with examples

Type study – Calotes. ( without endoskeleton)

General Topic: Identification of poisonous and non-poisonous snakes..

### **UNIT – IV**

#### **AVES**

General characters and classification up to orders with examples

Type study – Pigeon ( without endoskeleton)

General Topic Flight adaptations in Birds.

## **UNIT – V**

### **MAMMALIA**

General characters and classification up to orders with examples

Type study – Rabbit ( without endoskeleton)

General Topic: Aquatic Mammals.

### **Suggested Readings**

1. Ekambaranatha Ayyar & T.N.Ananthakrishnan (1995) A manual of Zoology Vol – II, (part I & II) S.Viswanathan Pvt. Ltd. Chennai.
2. Jordan.E.L & P.S.Verma (2000) „Chordate Zoology“ S.Chand & Co New Delhi.
3. Kotpal, R. L., Modern Text Book of Zoology – Vertebrates, Revised Edition (Reprint), Rastogi Publications, Meerut – 250 002.
4. . Young, J. Z., 2004, The Life of Vertebrates, 3rd Edition, Oxford University Press, London.
5. Parker and Hanswell, 2004, Text Book of Zoology, Vol II (Chordata), A.Z.T,B.S. Publishers and Distributors, New Delhi – 110 051.
6. Hickman, C.P. Jr., F.M.Hickuman and L.S. Roberts, 1984. Integrated Principles of Zoology, 7<sup>th</sup> Edition, Times Merror/Mosby College Publication. St. Louis. 1065pp.

## SECOND SEMESTER

### Core Paper Practical : BIO DIVERSITY OF CHORDATES AND VERTEBRATES

Paper Code: UZOP 124

#### I. DISSECTION

**Fish:** Digestive, Nervous system , Male and female Reproductive system

#### II. MOUNTING

1. *Scoliodon*: Placoid scales.
2. *Mugil*: Ctenoid scales.

#### III – SPOTTERS ( any 30 spotters)

##### A- Classify giving reasons up to order:

1. *Balanoglossus*
2. *Herdmania* (=Ascidian)
3. *Branchiostoma* (= *Amphioxus*)
4. *Petromyzon*
5. *Scoliodon sorrakowah*
6. *Mugil oeur*
7. *Rana hexadactyla*
8. *Calotes versicolor*
9. *Columba livia*
10. *Oryctolagusc cuniculus*

##### B - Draw labeled sketches:

11. *Amphioxus* – T.S. through pharynx.
12. *Doliolum*
13. *Salpa*
14. Arboreesant organ of cat fishe
15. Accessory respiratory organ of *Anabas*
16. Flight muscle of Birds
17. Poisonous apparatus of Snake
18. *Narcine*
19. *Naja naja*
20. *Typhlops*

##### C- Comment on Biological significance:

21. *Tornaria* larva
22. Ascidian Tadpole larva
23. *Anabas scandens*
24. *Hippocampus*
25. *Echeneis*
26. *Rhacophorus*
27. *Ichthyophis*
28. *Amblystoma*
29. Axolotle larva

30. *Chamaeleon*
31. *Vipera russelli* (= Russel's viper)
32. *Draco volans*
33. Bat

**D** –Relate structure and function:

34. Fish - air bladder
35. Fang of Snake
36. Placoid- Scale of Shark.
37. Filter feeding structure of Whale- Balen plates
38. Quill Feather of pigeon
39. Aquatic mammals- limbs
40. Contour feather

## **THIRD SEMESTER**

**Core Paper : ANIMAL PHYSIOLOGY**

**Paper Code : UZOC 231**

Objectives : Explaining various aspects of physiological activities of animals with special reference to mammals.

### **UNIT – I**

#### **Nutrition :**

Types of nutrition, Food and feeding mechanisms, Digestive enzymes and their role in digestion,

### **UNIT – II**

#### **Respiration :**

Respiratory organs, Respiratory pigments and functions. Transport of gases [Co<sub>2</sub> and O<sub>2</sub>] - Chloride Shift, Haldane and Bohr's effect

#### **Circulation:**

Composition, properties and functions of Blood , Mechanism of blood clotting, Structure of human heart- Cardiac cycle, Origin of heart beat , Pace maker , Regulation of heart beat, ECG, Blood Pressure, Arrhythmias

### **UNIT – III**

#### **Excretion :**

Kidney, Nephron - structure and mechanism of urine formation in mammals,.. Osmo ionoregulation and thermoregulation

### **UNIT – IV**

#### **Muscle Physiology:**

Types of muscles, Structure and chemical composition of skeletal muscle, Mechanism of muscle contraction

#### **Nerve Physiology:**

Neuron – Structure, types of neurons. Nerve impulse, Synapse , Synaptic transmission of impulses, Neurotransmitters and reflex arc.

## **UNIT -V**

### **Receptors:**

Photoreceptor – Structure of a mammalian eye, Retina – visual pigments, Physiology of vision.

Phonoreceptor – Structure of mammalian ear , Mechanism of hearing, Physiology of equilibrium, Chemoreceptors

### **Suggested Readings**

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

## **THIRD SEMESTER**

### **Core Paper Practical : Animal Physiology**

#### **Paper Code : UZOP 234**

1. Qualitative detection of human salivary amylase in relation to either pH or temperature.
- 2.. Oxygen consumption of fresh water fish with reference to body weight.
3. . Detection of nitrogenous waste products (Ammonia, urea and uric acid ). in fish tank water, frog tank water, bird excreta and mammalian urine/ Kidney.
4. Estimation of Haemoglobin from Human Blood
5. Determination of blood clotting time
6. Calculation of Body Mass Index (BMI)
7. Estimation of Erythrocyte Sedimentation Rate(ESR)
8. Measurement of Blood Pressure ( BP)
9. Pulmonary function test by Spirometer

#### **Spotters**

1. B.P.apparatus
- 2 Stethoscope.
3. ECG apparatus
4. Types of Muscle cell
5. Pace Maker
6. Nerve Cell
7. Nephron
8. Spirometer



## **THIRD SEMESTER**

**Core Paper : MICROBIOLOGY**

**Paper Code : UZOC 232**

Objectives: To emphasize the importance of integrating new knowledge on Microorganisms.

### **UNIT-I**

#### **Scope of Microbiology**

Diversity of Microbes, Broad classification of bacteria, fungi, yeast and virus.

Structure and functions of bacteria and virus , Bacterial Culture – Media & types.

### **UNIT-II**

#### **Microbes of the Environment**

Air, Water and Soil and its role in ecosystem, Role of Microbes in Ecosystem

Bioremediation of industrial wastes, sewage treatment plants,

### **UNIT-III**

#### **Agricultural Microbiology**

Microorganisms as biofertilizers, production and application of. Microbial biopesticides;

Mechanism of N<sub>2</sub> fixation.

### **UNIT –IV**

#### **Food Microbiology:**

Microbes of milk and food, Pasteurization and food spoilage. Fermentation techniques and Production of alcohol. Uses of microbes in food Industry - Bread , Vinegar,

### **UNIT- V**

#### **Microbial Control**

Concept of Sterilization pasteurization, tyndalization; fumigation, ultrasonication, and filtration.

### **Suggested Readings**

1. Burden, K.L. and R.P. Williams (6th Ed.) 1968. Microbiology. The Macmillan Co., London
2. Roberts, T.A. and F.A. Skinner (Eds.) 1983. Food Microbiology: Advances and Prospects, Academic Press, Inc. London,
3. Pelczer, M.J., Reid, R.D. And Chan, E.C.S. (1996), Microbiology, V Ed., Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Ananthanarayanan, T And Jayaram Paniker, C.K. (2000), Text Book of Microbiology, VI Ed., Orient Longman Ltd., Madras.
5. C.B.Powar, H.F.Daginawala, (1965) General Microbiology Himalayan Publishing House

## **THIRD SEMESTER**

### **Core Paper Practical : MICROBIOLOGY**

**Paper Code : UZOP 235**

1. Identification of microorganisms from the habitats [simple staining, differential staining,]
2. Morphological Observation of bacterial cell.
3. Methods of inoculation Of microbes – Spore plate, Streak and Swab.
4. Motility study of Lactobacillus – Hanging drop method

Spotters:- (any ten)

Mycoplasmas, Rickettsiae, Chlamydiae, Staphylococcus aureus, Streptococcus pneumoniae, Salmonella, HIV, Hepatitis virus and Rabies virus.

Fermentor, Bioreactors, Biofilters

## **THIRD SEMESTER**

### **Skill Enhancement Paper : VERMITECHNOLOGY**

#### **Paper Code : UZOS 233**

Objectives : To impart training on Earthworm culture technology  
To create knowledge on Self - Employment opportunity

#### **UNIT – I**

##### **Introduction:**

Definition and concept of vermiculture. Soil: major types (red soil, black soil, alluvial soil). Influence of soil organisms in vermitechnology- Litter degradation and decomposition. Problems in vermiculture and remedial solutions.

#### **UNIT – II**

##### **Types of earthworms:**

Endemic and exotic species of earthworms. Ecological classification of earthworms- epigeic, anecic and endogeic forms. Physical, chemical and biological changes caused by earthworms in soil drilospheres and vermicasts.

#### **UNIT – III**

##### **Vermicomposting:**

Vermicomposting materials, Vermicomposting methods Small scale and large scale Factors affecting vermicomposting - pH, moisture, temperature, Vermiculture unit - materials required and maintenance

#### **UNIT – IV**

##### **Vermicompost**

Harvesting of vermicompost - quality, properties and advantages over chemical fertilizers, packaging and marketing- cost benefit analysis. Vermiwash and its applications.

#### **UNIT – V**

##### **Natural enemies of earthworms**

Pests, parasites and pathogens affecting earthworms. Uses of earthworms in food and medicine - ayurvedic and unani. Recycling of food wastes in vermitechnology.

### **Suggested Readings**

1. Ismail, S.A. 1997. Vermitechnology. The biology of Earthworm. Orient Longman, India, 92 pp.
2. Ranganathan, L.S. – 2006 – Vermicomposting technology – from soil health to human health.
3. Gupta, P.K. 2008: Vermicomposting for sustainable agriculture [2nd edition] – Agrobios – India.
4. Edwards, C.A., and Bother, B. 1996: Biology of Earthworms – Chapman Hall Publ. Co., London.
5. Talashikar, S.C. 2008: Earthworms in Agriculture – Agrobios - India

## **FOURTH SEMESTER**

### **Core Paper : DEVELOPMENTAL BIOLOGY**

#### **Paper Code UZOC 241**

Objectives:

To understand ontogenesis, the development of animals including parthenogenesis and to study embryonic adaptations, human reproduction and reproductive technology in man.

#### **UNIT – I**

##### **Introduction**

Theories of developmental biology; Gametogenesis – Spermatogenesis and Oogenesis Types of eggs and egg membranes ; Fertilization – External and internal fertilization, sperm – egg interaction, physiological changes in the organization of egg cytoplasm, theories of fertilization. Parthenogenesis ,types -. Natural and artificial parthenogenesis.

#### **UNIT – II**

##### **Cleavage**

Types , Patterns and factors affecting cleavage; Types of blastula Blastulation and Gastrulation in frog and chick, Fate maps in frog and Morphogenetic movements.

#### **UNIT – III**

##### **Tubulation**

Neurulation and organogenesis : Development of brain, eye , heart in frog ; Extra-embryonic membranes. Placentation in mammals.

#### **UNIT-IV**

Genetic control of development- Organizer concept and embryonic induction. Concept of neotony and paedogenesis-Regeneration in Planarians and Amphibians. Metamorphosis in Amphibians.

#### **UNIT V**

Assisted reproductive technology- Human Pregnancy and Gestation, infertility- Artificial Insemination – Cryopreservation – in-vitro fertilization – Embryo Transfer and its advantages - Concept of test-tube baby. Ethics in assisted reproductive technology and embryo manipulation. Teratogenesis and factors involved.

### **Suggested Readings**

1. Balinsky, B.I. 1981. An Introduction to Embryology. W.B. Saunders Company. Philadelphia.
2. Berry.A.K.2007. An Introduction to Embryology, Emkay Publications, New Delhi-51.
3. Verma, P.S. and Agarwal V.K. 2005. Chordate Embryology (Developmental biology) S.Chand & Company Ltd., New Delhi.
- 4.Rastogi, V.B and Jayaraj, M.S. 2002. Developmental Biology Kedar Nath Ram Nath, Meerut.
5. Twymann, R.M. 2003. Developmental Biology. Viva Books Private Ltd., New Delhi.

## **FOURTH SEMESTER**

### **Core Paper Practical : DEVELOPMENTAL BIOLOGY**

#### **Paper Code UZOP 244**

1. Blastoderm mounting in Chick (demonstration only)
2. Study of the following prepared slides / models
3. Section of testis and Ovary [ Mammalian]
4. Slides of Mammalian sperm and ovum.
5. Study of Egg types – Frog's Egg, Hen's Egg.
6. Study of cleavage stages 2 Cell, 4Cell, 8Cell
7. Blastula and gastrula of Frog- yolk plug stage, neural plate and neural tube.
8. Slides of different stages of chick embryo – 18 hours [primitive streak stage], 24 hours, 48 hours 72 hours and 96 hours.



## **FOURTH SEMESTER**

### **Core Paper : VECTOR BIOLOGY**

#### **Paper Code UZOC 242**

#### **Objectives:**

To understand insect vectors of economic importance

To study vector born diseases and their control

#### **Unit-1**

Introduction - Scope of vector biology; Classification of insects vectors; - Morphological features of Insect vectors, Mouth parts, feeding habits; Types of Vectors (mechanical and biological ), Adaptations of vectors, Reservoirs, Host Specificity

#### **Unit-2**

Dipteran insect vectors – Mosquitoes, Sand fly, Houseflies; transmission cycles ,Study of Dipteran-borne diseases – Malaria, Dengue, Filariasis; Leishmaniasis, Phlebotomus fever; cholera and dysentery

#### **Unit-3**

Siphonapteran insect vectors – Flea, transmission cycles; Study of Flea-borne diseases – Plague, Endemic Typhus.

Siphunculatan insect vectors-Human louse, transmission cycles; Study of louse-borne diseases – Relapsing fever, Trench fever.

#### **Unit-4**

Hemipteran insect vectors – Bugs, transmission cycles; Bug-borne diseases; Chagas disease, Q fever.

#### **Unit - 5**

Control of vector and vector borne diseases; Vector control- Chemical, Biological, Genetic and Environmental. Insecticide resistance in vectors. Drug resistance in pathogens. Importance of education, awareness and Community participation.

## **Suggested Readings**

1. Imms, A.D. (1977). A General Text Book of Entomology. Chapman & Hall, UK
2. Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK
3. Hati, A. K. (2001). Medical Entomology. Allied Book Agency, Kolkata.
4. Pedigo L.P. (2002). Entomology and Pest Management. Prentice Hall Publication
5. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases. Wiley-Blackwell

**FOURTH SEMESTER**

**Core Paper Practical : VECTOR BIOLOGY**

**Paper Code UZOP 245**

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs:  
Aedes, Culex, Anopheles, Pediculus humanus capitis, Pediculus humanus corporis, Phthirus pubis, Xenopsylla cheopis, Cimex lectularius, Phlebotomus argentipes, Musca domestica, through permanent slides/ photographs
3. Study of different diseases transmitted by above insect vectors

## **FORTH SEMESTER**

### **Skill Enhancement Paper : CLINICAL LABORATORY TECHNOLOGY**

#### **Paper Code : UZOS 243**

Objectives :To impart awareness on Clinical Lab Technology  
To create knowledge on Self-Employment Opportunity

#### **Unit-I**

##### **Scope of Clinical Laboratory Technology**

Basic tools used clinical laboratory

Code and conduct for medical laboratory personnel, Safety measures in laboratory. Cleaning and sterilization-dry heat, moist heat, cold and UV radiations. Disposal of biomedical wastes..

#### **Unit-II**

##### **Blood collection procedures**

Capillary method, venous blood, estimation of haemoglobin. WBC total count- differential count; RBC-total count, platelet count. packed cell volume (PCV), Erythrocyte Sedimentation Rate (ESR), Blood grouping, Blood transfusion and blood banking.

#### **Unit-III**

##### **Biochemical Analysis**

Blood sugar and cholesterol estimation ,Urine - Physical characteristics and Composition and examinations . Analysis of sputum and faecal matter for Infection.

#### **Unit-IV**

##### **Screening of Parasites :**

Clinical diagnosis of diseases : Bacterial diseases : Tuberculosis and Typhoid. Viral diseases: AIDS and Polio. Protozoan diseases: Amoebiasis and Malaria. Nematodes diseases : Filariasis and Ascaris.

#### **Unit-V**

##### **Diagnostic methods**

X-Ray , EGC, EEG,CT, MRI,PET, Echo recording, Histopathological techniques - neoplastic tissue.

### **Suggested Readings**

1. **K.M.Samual & M.K.G.Iyyarstsans. (1984).** Clinical lab techniques-4<sup>th</sup> edition.
2. **Dr.K.N.Sachdev, Jaypee Brothers. (1988).** Clinical Pathology and Bacteriology. Medical Publisher.
3. **Kania Mukherjee.** Medical laboratory Techniques-Vol-I,II & III. 4<sup>th</sup> edition. Tata Mc Graw hill Publishing company.
4. **Ramnik Sood,M.D.(2006).** Medical laboratory Techniques-5<sup>th</sup> Jaypee brothers medical publishers.
5. **G.K.Pal and Pravati Pal .**Text book of practical physiology- Universities Press

## **FIFTH SEMESTER**

### **Skill Enhancement Paper : APICULTURE**

#### **Paper Code : UZOS 351**

Objectives: Entrepreneur motivation for practicing apiculture as cottage industry.

#### ***UNIT I***

Scope and history of Apiculture - systematic position of honeybee, Species of Honey bees , Biology and life history of Honey bee.

#### ***UNIT II***

Bee colony – social organization, bee communication,swarming,pheromone. Bee hive – structure and types of bee hives, Newtons beehives. Instruments used in Apiary.

#### ***UNIT III***

Site selection of apiculture, flora of apiculture – nectar,non nector and pollen plants, modern method of apiculture, Care and management of apiary.

#### ***UNIT IV***

Nector - honey composition and its formation. Medicinal and commercial values of honey. Bee wax and its uses, Diseases of honey bees and their control measures. Enemies of honey bee.

#### ***UNIT V***

Economic Importance of Apiary products, Bee Keeping Industry status in India, Recent Efforts, Apiculture as self – employment venture.

#### ***Suggested Readings***

1. Cherian R, & K.R. Ramanathan, 1992 – Bee keeping in India,
2. Mishra, R.C., 1985 – Honey bees and their Management in India, ICAR.
3. Singh, S.1982-Bee keeping – ICAR
4. Sharma, P. and Singh L. 1987 – Hand book of bee keeping, Chandigarh
5. Rare, S. 1998-Introduction. to bee keeping, Vikas publishing house.

## **FIFTH SEMESTER**

### **Specific Elective Paper : IMMUNOLOGY**

#### **Paper Code UZOE 352**

Objectives : To study the process which help to maintain the organisms internal environment, when challenged with foreign substances.  
To understand the advances in Immunology

#### **Unit: I**

Introduction-Scope of immunology- Historical perspectives - Immunohaematology- blood groups, blood transfusion, Rh-incompatibilities; Types of immunity- innate and acquired immunity.

#### **Unit: II**

Anatomy of lympho-reticular system- primary and secondary lymphoid organs; Cells of the immune system, T and B cells receptors-activation and function.

#### **Unit: III**

Antigens- Types, properties, antigenic determinants, haptens, adjuvants. Immunoglobins- types, structure and properties, Monoclonal and polyclonal antibodies; Antigen-antibody interactions. Vaccines- types, toxoids, antitoxins.

#### **Unit: IV**

Immune responses- Primary and secondary immune response- Cell mediated and humoral immune responses, Immune responses against tumors, Immunologic tolerance and disorders, autoimmune diseases.

#### **Unit: V**

Complement system- Classical and alternate pathway , MHC-classes, haplotype, MHC and peptide interactions. Hypersensitivity reactions – types and diseases. Types of grafts, graft Vs host reactions.

### **Suggested Readings**

1. Ivan M.Roit 1994. Essential Immunology-Blackwell scientific publications, oxford.
2. Janis kuby 1993. Immunology II edition. W.H.Frumen and company, New york.
3. William E.Paul 1993. Fundamental immunology. II edition Raven press, New york.
4. Ian R. Tizard, 1995, Immunology: An Intoduction, 4<sup>th</sup> edition, Saunders College Publishing,
5. Chakravarthy, A.K. (1996) – Immunology, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.



**FIFTH SEMESTER**

**Specific Elective Paper Practical : IMMUNOLOGY**

**Paper Code UZOP 358**

1. Human Blood grouping [ABO and Rh]
2. Study of prepared slides of primary and secondary lymphoid organs.

Thymus

Spleen

Bone marrow

Lymph node.

Peyers patches

Bursa fabricus

T – cell

B- cell

MALT

GALT

## **FIFTH SEMESTER**

### **Specific Elective Paper : ORNAMENTAL FISH CULTURE AND AQUARIUM TECHNOLOGY.**

#### **Paper Code UZOE 353**

#### **Objectives:**

- To impart training on Aquarium fish keeping technology
- To create knowledge on self employment opportunity

#### **UNIT – I**

Importance and scope of ornamental fish culture – Economic potential, commercial and aesthetic value of ornamental fish culture, trends in ornamental fish farming in the world and in India. Taxonomy of important freshwater and marine ornamental fish of indigenous and exotic species.

#### **UNIT – II**

Popular ornamental fishes: Beta, Colisa, Macropodus, Trichogaster leeri, T. italics microlepis, Zebra fish. Gold fish varieties: Koi, Puntius, tetra, Glass fish, cichilids, angel fish, molly, guppy. Marine species: Hippocampus, scat, Biology, habits and patterns of reproduction of Gold fish and Zebra fish.

#### **UNIT – III**

Fish farms - mass production of fancy fishes, preparations for breeding – breeding behaviour of chosen fishes: carp, fighter fish – induced breeding – food and feeding – live feeds: rotifers, tubifex and artificial feeds.

#### **UNIT –IV**

Disease management: Common bacterial, viral, fungal, protozoan and crustacean infections - treatment and control.

#### **UNIT –V**

Aquarium design, Construction and preparation: size, shape, substrate, ornamental aquatic plants. Construction and functions of Bio-filters; aerators – accessories for fish tanks – hood and

light, nets, suction tube and maintenance of water quality: controlling ammonia build up, pH, feeding regimes.

**Suggested Readings.**

1. Baradach, JE, JH Ryther and WO Mc Larney (1972). Aquaculture. The Farming and Husbandry of Freshwater and Marine Organisms. Wiley Interscience, New York.
2. Jameson, J.D. and R.Santhanam (1996). Manual of ornamental fisheries and farming technology. Fisheries College and Research Institute, Thoothukudi.
3. Mitchell Beazley, 1998. The complete guide to tropical aquarium fish care. Read and Consumes Book Ltd., London.
4. Jameson, J.D. Alangara Meen Valarpu (in Tamil). National Book House, New Delhi.
5. Mill Dick, 1993: Aquarium fish, DK Publ.Co,Inc. New York –USA

**FIFTH SEMESTER**

**Specific Elective Paper Practical : ORNAMENTAL FISH CULTURE AND  
AQUARIUM TECHNOLOGY**

**Paper Code UZOP 358**

1. Identification of Common freshwater aquarium fishes
2. . Identification of Common marine ornamental fishes
3. . Identification of plants and décor materials for aquarium
4. Identification, symptoms and treatment of diseases of aquarium fishes
5. Field visit: Visit to ornamental/aqua farms ( Tour report submission)

## **FIFTH SEMESTER**

### **Specific Elective Paper : CELL AND MOLECULAR BIOLOGY**

#### **Paper Code UZOE 354**

#### **Objectives:**

To learn the structure and functions of various cellular components.  
To understand the molecular basis of cell structure DNA structure and functions.

#### **Unit – I**

History of cell biology – Cell theory – Cell as the basic unit of living organism,  
Difference between Prokaryotic and Eukaryotic cell, Ultra structure of an Animal Cell,  
Plasma membrane – Ultra structure, chemical composition, models ( Bilayer, Unit  
membrane, fluid mosaic) and functions.

#### **Unit-II.**

Cell organelles – Ultra structure, chemical composition and functions of Endoplasmic  
reticulum, Ribosomes, Golgi complex, Lysosomes, Centrioles, and Mitochondria.

#### **Unit – III**

Nucleus and Nucleolus – structure, composition and functions. Chromosomes – structure,  
heterochromatin and Euchromatin, Giant chromosome – polytene and lambrush Cell Cycle  
– mitosis and meiosis.

#### **Unit IV.**

Nucleic acids – Molecular structure of DNA and RNA , DNA replication, Transcription,  
Types of RNA, Protein Synthesis (Eukaryotic) , Regulation of Protein Synthesis.

#### **Unit V.**

Gene Mutation, Molecular basis of Gene Mutation (Sickle cell anemia, phenylketonuria) –  
Mutagenic agents - Physical and chemical. DNA Repair , DNA Recombination  
DNA barcoding- role of mitochondrial DNA in barcoding;

**Suggested Readings:**

1. Verma, P.S., and V.K. Agarwal, 1995, Cell and Molecular Biology, 8th edition, S. Chand & Co., New Delhi-110 055, 567
2. De Robertis, E.D.P. and E.M.F. De Robertis, 2006, Cell & Molecular Biology, 8th Edition, Indian Reprint.
3. Rastogi, S.C., 2010, Cell and Molecular Biology, Second Edition. New Age International (p) Ltd., New Delhi.
4. Powar, C.B., 1989. Essentials of Cytology, Himalaya Publishing House, Bombay, 368p.
5. Loewy, A.G. and P. Sickevitz, 1969, Cell Structure and Function, Amerind Publishing Co., New Delhi-110 020, 516pp.

## **FIFTH SEMESTER**

### **Specific Elective Paper Practical : CELL AND MOLECULAR BIOLOGY**

#### **Paper Code UZOP 358**

1. Onion root tip – squash preparation and study of mitosis
2. Chironomous larva - squash preparation of giant chromosome.
3. Squash preparation of squamous epithelial cells from buccal smear
4. Measurement of cell dimensions by using stage and ocular micrometer
5. Total count of RBC and WBC using Haemocytometer.
- 6 Blood Smear Preparation – Differential count of W.B.C.
7. Study of prepared slides of histology.

Columnar Epithelium

Ciliated epithelium

Glandular Epithelium

Cartilage T.S.

Bone T.S.

Male germ cell -sperm

Female germ cell- egg

8. Isolation and Estimation of DNA and RNA (Demonstration only)
9. Protein separation by Gel electrophoresis (PAGE) (Demonstration only)

## **FIFTH SEMESTER**

### **Specific Elective Paper : BIOCHEMISTRY AND INTERMEDIARY METABOLISM**

#### **Paper Code UZOE 355**

#### **Objectives:**

To define and explain the basic principles of biochemistry and metabolic pathway

#### **UNIT I**

Scope of Biochemistry – Dissociation constant of water, Hydrogen ion concentration, Buffers and electrolytes. Acidity, alkalinity and pH determination.

#### **Unit-II**

Carbohydrate: classification and structure of carbohydrate with examples. Protein: classification and structure with examples. Lipid: classification and structure with examples.

#### **Unit-III**

Enzymes: classification, mechanism of enzyme action, factors affecting enzyme action, Isoenzymes. Vitamins: Structure and function of fat and water soluble vitamins.

#### **UNIT-IV**

Intermediary metabolism-Glycolysis -TCA Cycle- Electron transport chain, Deamination, of aminoacids, B- Oxidation of fatty acids. HMP shunt pathway

#### **UNIT – V**

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

#### **Suggested Readings**

1. H.S. Srivastava, Elements of Biochemistry (2006) Rastogi Publications, Meerut.
2. . Rastogi, S.C., 2007, Outlines of Biochemistry: A Quick Review.
3. Veerakumari.L, 2004, Bio Chemistry, MJP Publications.
4. Harpers Biochemistry – Robert K.Muuay., Daryl.K.Granner., Peter.A.Mayes., & Victor.W.Rodwell (2004) Prentice Hall International, ISBN-8385-3612-3.
5. Principles of Biochemistry y A.L Lehninger, D.L Nelson& M.M.Cox (1993) Worth publishers Newyork.



## **FIFTH SEMESTER**

**Specific Elective Paper Practical : BIOCHEMISTRY AND INTERMEDIARY**

### **METABOLISM**

**Paper Code UZOP 358**

1. Qualitative analysis of sugar
2. Qualitative analysis of Glycogen
3. Qualitative analysis of Protein
4. Quantitative analysis of glucose
5. Quantitative analysis of protein
6. Separation of Aminoacid by Paper Chromatography
7. Enzyme Assay – Urease
8. pH meter
9. Models of biomolecules

## **FIFTH SEMESTER**

### **Specific Elective Paper : BIO-INSTRUMENTATION**

#### **Paper Code UZOE 356**

#### **Objectives:**

To acquire the knowledge of basic principles and applications of tools. To know the techniques for the measurement of physical, physiological, biochemical and biological factors in man and other living organism.

#### **UNIT – I**

Microscope - Principles and types of light Microscope , Phase Contrast Microscope, X-ray Microscope, Fluorescence Microscope, Confocal microscope , Type of Electron Microscope ( SEM and TEM)

#### **UNIT – II**

Centrifuge - Types of Centrifuge – Clinical ,Refrigerated and High Speed centrifuges.  
pH meter and its application, Colorimeter, Spectrophotometer - Principle, Structure and Uses.

#### **UNIT – III**

Chromatography – Types - Paper, Thin layer, Column Chromatography  
Electrophoresis – Types – Paper and PolyAcrylamide Gel Electrophoresis.

#### **UNIT – IV**

Blotting techniques – Southern, Northern and Western

DNA and RNA sequencing method ( First,second and third generation) , PCR and gene amplifier.

#### **UNIT – V**

Geiger Muller Counter, Biochemical application of radioisotopes,  
Radio isotopic technique – Radio Immuno assay , Autoradiography

### **Suggested Readings**

1. A.Upadhyaya, K.Upathyaya and N.Nath, (2003) Biophysical chemistry, Principles and Techniques, 3rd Ed, Himamalaya publishing house.
2. H.B.Bull, F.H.Davis, An introduction to physical Biochemistry 2nd Ed, Philadelphia 1971.
3. Gurumani.N 2006. Research methodology for biological sciences MJP publ. Chennai
4. T.S.work and E.Work, 2001. Laboratory techniques in Biochemistry and Molecular Biology.
5. Keith Wilson and John walker,2010. Principle and techniques of biochemistry and Molecular Biology.

## **FIFTH SEMESTER**

### **Specific Elective Paper Practical : BIO-INSTRUMENTATION**

#### **Paper Code UZOP 358**

#### **Experiment/Spotter**

1. Determination of pH by pH meter
2. Principle and Operation of Centrifuge
3. . Principle and Operation of Colorimeter
4. . Principle and Operation of Spectrophotometer
5. . Principle and Operation of Electrophoresis

## **FIFTH SEMESTER**

### **Generic Elective Paper : PUBLIC HEALTH AND HYGIENE**

#### **Paper Code UZOG 357**

Objectives: To impart awareness on public health and Hygiene  
To create knowledge on Health Education.

#### **UNIT – I**

##### **Concepts of Public Health and Hygiene**

Nutrition and health- Malnutrition and Over nutrition, Nutritional Deficiencies, Vitamin deficiencies.

#### **UNIT – II**

##### **Environment and Health Hazards :**

Need of Water Purification, Adulteration of Food, Undesirable Changes in Air , Radiation effects, e- waste, Solid waste and Excreta disposal

#### **UNIT-III**

##### **Communicable diseases and their control measures:**

Air Borne Disease : Tuberculosis, Influenza

Food and water Borne Disease : Amoebiasis, Jaundice

Vector Borne Disease : Malaria, Dengue

Contact Disease : Venereal disease and AIDS

#### **UNIT – IV**

##### **Non – communicable diseases and their preventive measures:**

Hypertension, Coronary Heart Diseases, , Diabetes, Obesity and Tumour

Haemophilia and Sickle Cell Anaemia, Occupational health Hazards

#### **UNIT – V**

##### **Health Education in India :**

Ill Effects of Smoking, Alcoholism and drug abuse

WHO programmes, Government and voluntary Organizations – vaccination and awareness programme. First Aid- Precautions and awareness on Personal hygiene.

### **Suggested Readings**

1. Park and Park, 1995: Text book of preventive and social medicine – Banarsidas Bhanot Publ. jodhpur- India.
2. Verma, S. 1998: Medical zoology, Rastogi Publ.- Meerut- India
3. Jatin V. Modi and Renjith S. Chawan. Essentials of Public Health and Sanitation –Part I- IV
4. Murray, C. J. L. and A.D. Lopez. (1996). The Global Burden Of Disease. World Health Organization.
5. Park, J.E. and Park, K. Textbook of Community Health for Nurses.

## **SIXTH SEMESTER**

### **Skill Enhancement Paper : AQUATIC BIOLOGY AND CULTURE TECHNIQUES**

**Paper Code : UZOS 361**

Objectives: To study and understand the biology of fishes and make the students to know about the culture techniques of fish.

#### **UNIT – I**

Introduction-Scope of aquaculture. Classification and biology of cultivable finfishes – food and feeding, digestive enzymes and their role with food habits; Age and growth- Respiratory structure and functions; Reproduction and reproductive cycles of Catla.

#### **UNIT – II**

Marine fisheries of India- Major fisheries of India ( Sardine, Mackerel, tuna), and their characteristics; Indian major and exotic carps and their characteristics. Fishing technology- fishing craft and gear; Types of fish culture: Extensive, intensive, semi-intensive and pokkali culture- cage and pen culture . Monosex and monoculture-polyculture- advantages of polyculture - integrated fish culture.

#### **UNIT – III**

Site selection – elementary survey –design and construction of fish and prawn ponds (stocking pond and rearing pond), Maintenance and management of culture ponds. Selection criteria for cultivable species -Culture of Carp, pearl oyster.

#### **UNIT – IV**

Fish disease management: Common bacterial, viral, fungal, protozoan and crustacean diseases, their symptoms and treatment. Control of aquatic weeds, predatory and weed fish control. Feeds for cultivable species – natural, supplementary and artificial feeds.

#### **UNIT – V**

Marketing the products: Harvesting and transport -marketing the fish to local markets and for export. Quality control and norms of MPEDA for export of fishes- HACCP concept; Fish preservation-canning and freezing method. Products, byproducts and value added products of fishes.

### **Suggested Readings**

1. Rath, R.K. (2000) Freshwater Aquaculture. Scientific Publishers, (India), PO. Box.91, Jodhpur.
2. Jhingran, AVG (1991) Fish and Fisheries of India. Hindustan Publishing Co.
3. T.V.R. Pillay, 1990. Aquaculture principles and practices. Fishing News (Book) Ltd., London
4. R. Santhanam, N. Sukumaran and Natarajan, - A manual of fresh water aquaculture, Oxford and IBH Publishing Co Pvt.Ltd., Mumbai.
5. B.N. Yadav, - Fish and fisheries, Daya Publishing House, Delhi.



## **SIXTH SEMESTER**

### **Specific Elective Paper : ENDOCRINOLOGY AND REPRODUCTIVE BIOLOGY**

**Paper Code UZOE 362**

Objectives : Explaining the role of hormones on physiological activities of animals with special reference to humans.

#### **UNIT – I**

Scope of Endocrinology, Endocrine glands, hormones and hormone action,  
Structure , hormone secretion and functions of hypothalamus and pituitary gland  
Pineal gland – circadian rhythm.

#### **UNIT – II**

Structure of thyroid gland – Biosynthesis of thyroid hormones,  
Biological functions of Thyroid hormones, Regulation of Thyroid secretion  
Hormones of parathyroid Glands and their biological action

#### **UNIT – III**

Adrenal Cortex – Glucocorticoids, Mineralocorticoids and their biological function  
Renin Angiotensin System  
Adrenal Medulla – Catecholamines – Synthesis and Biological action

#### **UNIT – IV**

Pancreatic (Islets of Langerhans) hormones – Insulin ,Glucagon – Biosynthesis,  
Regulation , Biological action, Gastrointestinal Hormones

#### **UNIT – V**

Male reproductive system  
Structure of Testes, Biosynthesis of testosterone , Regulation and functions  
Female reproduction system  
Structure of Ovary , Biosynthesis of estrogen , Feed back regulation and functions  
Female Reproductive Cycle – Estrous, Menstrual  
Placental hormones – parturition – Lactation.

### **Suggested Readings**

1. Mac E Hadley, 1992 Endocrinology, Third edition, prentice Hall, New Delhi Jersey
2. Wilson J.D and Foster D.W 1992, William's textbook of endocrinology, 8th edition, WB saunders company, Philadelphia.
3. Turner C.D and Bagnarr, J.T., 1994, General Endocrinology, 6th edition, WB saunder's company, Philadelphia [saunder's international students edition]
4. Prakash S Lohar Endocrinology, Hormones and Human Health.
5. Hormones" by A.W. Norman and G. Litwack, Academic Press 2<sup>nd</sup> Edition

**SIXTH SEMESTER**

**Specific Elective Paper Practical : ENDOCRINOLOGY AND  
REPRODUCTIVE BIOLOGY**

**Paper Code UZOP 368**

1. Observation of permanent slides – Pancrease, Testes,Ovary, Adrenal Pituitary
2. Test for Pregnancy
3. Fertility test

## **SIXTH SEMESTER**

### **Specific Elective Paper : POULTRY AND DAIRY SCIENCE**

#### **Paper Code UZOE 363**

#### **Objectives:**

- To impart training on Modern Poultry and Dairy Science Technology
- To create knowledge on self employment opportunity.

#### **UNIT – I**

External morphology of a fowl, Classification of fowls based on their Use.

Nutritive value of meat and egg, Meat type – Broilers, Egg type- White Leghorn, Dual purpose Varieties, Game and Ornamental purpose Varieties

#### **UNIT-II**

Management of Broilers and Egg Layers – Housing and Equipment, Brooding, feeding and health care Poultry diseases- prevention and control ( any five), Vaccination

#### **UNIT-III**

Dairy breeds of India : Cattle and Buffaloes, Native and Exotic Breeds

Nutritive value of Milk and meat , Milk synthesis and Secretion, Composition of Milk.

Artificial Insemination Programme, Merits and Demerits of Inbreeding and Outbreeding

#### **UNIT-IV**

Farm Management : Housing and Equipments of dairy forms- Feed, Care and Management of adult and newborn calves, Live Stock diseases and Management

#### **UNIT-V**

Storage and Marketing of Poultry and Dairy Products, Role of Govt. and Co operative Societies in Production and Marketing. Progressive plans to promote Poultry and Dairy technology as a Self employment Venture.

### **Suggested Readings**

1. Gopalakrishnan C.A and G.Murley Mohan Lal 1997,Livestock and Poultry enterprises for rural development, Vikash, New Delhi.
2. Gnaanamani M.R., 1998 Modern aspects of commercial poultry keeping, Giri.
3. Chauhan H.V.S. and S.Roy, Poultry diseases, diagnosis and treatment New Age International, 1996.
4. . G.C. Banerjee – A Text book of Animal Husbandry – Oxford & IBH Publication, New Delhi.
5. . GH Schmidt; T.D. Van Vleck, - Principles of Dairy science – Surget Pvt. Ltd., 1982.

## **SIXTH SEMESTER**

### **Specific Elective Paper Practical : POULTRY AND DAIRY SCIENCE**

#### **Paper Code UZOP 368**

1. Identification of feathers
2. Incubation of Eggs: Temperature and humidity control.
3. Identification of eggs
4. Biochemical estimation of nutritive contents in a hen's egg (demonstration)
5. Visit to poultry markets and study of specific marketing problems.
6. Testing freshness of Egg
7. Screening of fertilization

#### **Spotters/Chart**

1. Identification of different varieties of poultry and dairy
2. Equipments

## **SIXTH SEMESTER**

### **Specific Elective Paper : EVOLUTION AND CONSERVATION BIOLOGY**

#### **Paper Code UZOE 364**

Objectives :

To explain the scientific concepts of animal evolution through theories and evidences.

#### **Unit –I**

Origin of Life on Earth, Evidences of Evolution – Morphological, Embryological, and palaeontological. Geological time scale – Fossils & Fossilization ,Dating of Fossil  
Living,connecting and Extinct Fossils.

#### **Unit –II**

Theories of Evolution : Lamarckism, Neo-lamarckism, Darwinism, Neo-Darwinism, Devries  
concept of Mutation, Modern version of Mutation theory.

#### **Unit –III**

Origin of Species, Phylogentic and biological concept of species: Mechanisms of reproductive  
isolation; Models of speciation

Hardy –Weinberg law of genetic equilibrium. natural selection, mutation, genetic drift and  
migration.

#### **Unit –IV**

Concepts of conservation : prospective and expression of biodiversity concepts, Scope- Regional  
and National approaches for biodiversity conservation, Conservation of terrestrial and aquatic  
resources. Human impact on terrestrial and aquatic resources, Information on CITES,IUCN,  
CBD and RDB. Concepts of threatened fauna of India. IUCN categories, wildlife conservation  
approaches and limitations, Project tiger.

## **Unit – V**

Threats to biodiversity: Habitat loss; invasive species, Overexploitation, Climatic changes.  
Anthropogenic activities: Pollution. Biodiversity management : Ex-situ and In-situ conservation.  
Protected areas- Wild life wealth of India, Hot spots, Restoration of damaged ecosystem and endangered population

### **Suggested Readings**

1. Dobzhansky, T., F.J. Ayala, G.L. Stebbins and J.M. Valentine 1998. Evolution, Surjeet Publications, New Delhi.
2. Dobzhansky T 1984 Genetics and Origin of species. Columbia Univ. Press.
3. Krishnamurthy, K. V. 2003. Textbook of Biodiversity. Science Publication.
4. Groom, M. J., Meffe, G. R. and Carroll, C. R. 2006. Principles of Conservation Biology, Sinauer Associates, Inc., USA.
5. Rangarajan M. (2001) India's Wildlife History. Permanent Black, New Delhi, India.



## **SIXTH SEMESTER**

### **Specific Elective Paper Practical : EVOLUTION AND CONSERVATION BIOLOGY**

#### **Paper Code UZOP 368**

1. Study of Fossils
2. Field Visit to wild life sanctuaries and National parks( Tour report submission)
3. Homologous organs
4. Analogous organs
5. Industrial melanism
6. Adaptive radiation ( Darwin finches)
7. Living fossils
8. Connecting link
9. Hardy Weinberg law calculation

## SIXTH SEMESTER

### Specific Elective Paper : GENETICS AND BIOTECHNOLOGY

#### Paper Code UZOE 365

Objectives:

To know the principles of genetics and to integrate biology with technology.

#### UNIT – I

Introduction to genetics , Basis of Mendelian Inheritance and Mendelian Laws, Interaction of Genes –Multiple Alleles – Blood Groups and their Inheritance in Human.

#### UNIT – II

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

#### UNIT –III

Chromosomal aberrations: Euploidy, Aneuploidy and Polyploidy – Turners Syndrome, Klinefelters Syndrome, Down syndrome and Cat- Cry Syndrome . Hybridization –Inbreeding, Out breeding, Heterosis.

#### UNIT – IV

Definition – Scope and importance of Biotechnology -Tools of Genetic Engineering – Restriction enzymes – nuclease, ligase, polymerase and reverse transcriptase – cloning vectors – plasmid (pBr322), lambda phage,cosmid and phasmids.

#### UNIT – V

Techniques of Genetic Engineering – an overview of R DNA technology, application of R DNA technology in agriculture, medicine and environment.

#### Suggested Readings

- 1) Verma P.S. and Agarwal V.K. – Concepts of Genetics
- 2) Rastogi V.B. A text book of Genetics, Kadarnath, Ramnath, Meerat.
- 3) Sambamurthy. AVSS - Genetics – Narosa Pub. House, New Delhi.
4. P.K.Gupta – Elements of Biotechnology [2001] Rastogi publication, Meerut.
5. Lohar.P.S – Biotechnology (2005) – MJP Publishers, Chennai – 5.

## **SIXTH SEMESTER**

### **Specific Elective Paper Practical : GENETICS AND BIOTECHNOLOGY**

#### **Paper Code UZOP 368**

#### **GENETICS**

1. Observation of wild and Mutant forms of Drosophila.
2. Human Blood Grouping.
3. Study on Normal Karyotype - male and female,
4. Chromosomal Disorder : Down syndrome, Turner and Klinefelter syndrome

#### **BIOTECHNOLOGY**

5. Study of prepared slides, Models or specimen.

Escherichia coli

Bacteriophage

Plasmid

6. Demonstration of P.C.R technique: Southern blot, Electrophoresis
7. Visit to Biotechnology lab and Report.

## SIXTH SEMESTER

### Specific Elective Paper : BIOSTATISTICS AND BIOINFORMATICS Paper Code UZOE 366

Objective:

To get a basic knowledge of statistical methods and the application of information technology to the management and analysis of biological data.

**UNIT –**

#### ***UNIT I***

Biostatistics – Definition and Scope – Collection of Data – Census and sampling methods – Variable - Discrete and Continuous. Presentation of Data – Diagrammatic representation of Bar, pie, histogram, frequency polygon, frequency curve. Concept of statistical population and sample characteristics of frequency distribution

#### ***UNIT II***

Measures of central tendency-Mean, Mode and Median, Variance, Standard deviation, Standard error and Coefficient of variance. Simple Correlation, Simple Regression, Chi square test, student's *t*-test,

#### ***UNIT III***

Introduction - Scope of Bioinformatics and bioinformatics resources, Principles of protein structure- Tertiary and Quarternary structure, DNA and RNA Sequencing ; Sequence alignment- pairwise and multiple sequence alignment, local and global alignment, tools of bioinformatics- BLAST, FASTA and CLUSTAL W.

#### ***UNIT IV***

Biological databases- Gene Bank - NCBI, EMBL and DDBJ- Protein databases ( primary, composit and secondary) SWISSPROT, PIR and PROSITE. Structure databases-PDB, CATH, SCOP, Proteomics, Genomics- Human Genome Project., metagenomics, concepts of metabolome and metabolomics. Specialised Genome database(SGD, TIGR and AceDB)

## ***UNIT V***

Networking and internet: Introduction to networks, types of network, application of network, use of internet, WWW, concept of E-Mail. Computer and its application to biology; Basic Knowledge of Medical transcription and Bio – Informatics; Potentials of bioinformatics .

### **Suggested Readings**

1. Gurumani, N. 2004, Introduction to Bio-statistics, M.J.P. Publishers, Delhi.
2. Annadurai, B., 2007, A Text Book of Biostatistics, 1<sup>st</sup> Edition.
3. Saha.T.K.(1992) Biostatistics in theory and Practice, Emkay Publications., New Delhi – 15. 3.
4. S. Sundara Rajan and R. Balaji, 2002, Introduction to Bioinformatics, Himalaya Publishing House, New Delhi.
5. Smith, Introduction to bioinformatics, Pearson Education Ltd., New Delhi.

## **SIXTH SEMESTER**

### **Specific Elective Paper Practical : BIOSTATISTICS AND BIOINFORMATICS**

**Paper Code UZOP 368**

#### **BIOSTATISTICS**

Frequency distribution of given samples to find out arithmetic mean, median mode range and standard deviation for a biological data (Variation between any two parameters (Height &Weight))

#### **BIOINFORMATICS**

Computer components, usage of computer internet and E-mail Download and study atleast two samples of Genome sequences (DNA , protein).

#### **SPOTTERS**

Parts of Computer, Copies of Genome, Sequences DNA and Proteins.

## **SIXTH SEMESTER**

### **Generic Elective Paper : VALUE ADDED PRODUCTS OF ANIMALS Paper Code UZOG 367**

#### **Unit-I**

Products and value added products of bee keeping: Honey – bee wax, bee venom – Honey Production, chemical composition – Economic importance of Honey bee wax. Value added products of honey- Fermented honey (mead), honey paste for dressing wounds, honey jelly, honey caramels, creamed honey, comb honey, honey beer, honey fruit syrup, honey with fruits and nuts and honey gums their manufacture,

#### **Unit –II.**

Fishery products, by-products and value added products – Fish protein concentrate, fish oils- fish liver oil and body oil, squalene from shark liver oil, fish gelatin, fish glue, fish maws and isinglass, fish wafers, fish silage, fish skin leather, shark cartilage, fertilizer from fish waste, chitin and chitosan, surumi, roe, ambergris-ready to cook and ready to eat products - Additives and classes of additives.

#### **Unit -III**

Meat Products: Canned meat, Frozen meat, Cooked and Refrigerated meat, Dried and preserved meat, Cured meat, Prepared meat products, Production methods for Intermediate moisture and dried meat products, Different kinds of goat meat products -Curried goat, Goat Sausage, Goat Hamburger - Curried goat burrito; Organ products for food and pharmaceuticals.

#### **Unit -IV**

Poultry Products: Poultry meat processing operations in detail along with equipment used – Packaging of poultry products, refrigerated storage of poultry meat, by products – eggs, egg products, Whole egg powder, Egg yolk products, their manufacture, packaging and storage.

#### **Unit -V**

Milk Products : Testing and grading of raw milk. Pasteurized, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined and flavoured milks. Preparation of cultured

milks, cultures and their management, yoghurt, Dahi, Lassi and Srikhand. Milk products such as Cream, Butter, Ghee, Khoa, Cheese, condensed, evaporated, dried milk and baby food, Ice cream and Kulfi, butter milk, lactose and casein.

### **Suggested Readings**

1. Krell,1996.Value-added products from beekeeping.FAO agricultural services bulletin no.124, FAO, United Nations, Rome.<http://www.fao.org/docrep/woo76Eoo.htm>.
2. La Bell, F. 1988. Honey :Traditional food finds new uses.Food Process.11:111-114.
- 3.Spottel,W.1950. (Honey and dried milk). J.A. Barth,Leipzig, Germany,p.323.
4. Gopakumar, K.1997. Tropical Fishery Products. Oxford & IBH Publications.
5. Chandran, K.K., 2000. Post Harvest Technology of Fish and Fish Products. Daya publishing House, New Delhi.



## **FIRST SEMESTER**

### **Basic Zoology (for Botany and Chemistry Main)**

#### **Paper Code UZOC 112**

##### ***UNIT I***

General classification of Animal kingdom- general characteristics of Invertebrata, Chordata and Vertebrata

##### ***UNIT II***

Protozoan parasites of human ( Entamoeba, Trypanasoma), Canal system in sponges, Polymorphism in coelenterates, Helminth parasites of human (Tapeworm, Ascaris), Coelom and its significance.

##### ***UNIT III***

Respiration in Arthropods. Metamorphosis in Insects. Economic importance of mollusca. water vascular system in Echinodermata, Larval forms in Echinodermata.

##### ***UNIT IV***

Life cycle and retrogressive metamorphosis in Ascidia. Life cycle of Amphioxus. Life cycle of Balanoglossus and affinities.

##### ***UNIT V***

Accessory respiratory organ in Fishes, Migration of Fishes. Parental care of Amphibia. Primary and Secondary terrestrial adaptations. Flight adaptation. Aquatic mammals and placenta in Mammals.

#### **Suggested Readings**

1. Ekambaranatha Ayyar, M and Ananthkrishnan, T.N. 1993, Outlines of Zoology, Vol.I and II, Viswanathan and Co. Madras.
2. Jordan, E.K. and P.S. Verma, 1993. Chordate Zoology, 12th edition, S. Chand & Co. Ltd., Ram Nagar, New Delhi.
3. Text book of Invertebrata – N.Arumugam et al., (2008) Saras Publications Nagerkovil
4. P.S. Dhami and J.K. Dhami – Invertebrate Zoology – S.Chand and Co. New Delhi.
6. Invertebrate Zoology – R.L.Kotpal, (2005) Rastogi Publications, Meerat..

## FIRST SEMESTER

**Practical : Basic Zoology (for Botany and Chemistry Main)**

**Paper Code UZOP 115**

### **I. Major Practical:**

#### **A.. Prawn:**

1. Digestive system
2. Nervous system

#### **B. Cockroach**

3. Digestive system
4. Nervous system

### **II. Minor Dissection and Mounting:**

- a) Earth worm - Body setae
- b) Honey bee - Mouth parts
- c) Mosquito - Mouth parts
- d) Prawn - Appendages

### **III. Spotters:**

*Amoeba, Paramecium, Entamoeba, Plasmodium, Sycon, Obelia geniculata*, Sea anemone on hermit crab, *Aurelia, Fasciola hepatica, Taenia solium, Ascaris* – Male & Female, Leech, Fresh water mussel, star fish, *Amphioxus*, Shark (Placoid scale), *Ichthyophis*, Cobra, Pigeon (feathers) and Rabbit.

### **IV. Submission of Record**

## **SECOND SEMESTER**

**Animals and Human welfare (for Botany and Chemistry Main)**

**Paper code : UZOC 122**

### **Unit – I: Biodiversity and Human Welfare**

Threats to Biodiversity - Habitat loss and Man-Wildlife conflict.

National parks, Sanctuaries and Biosphere reserves

### **Unit – II:**

#### **Animal husbandry:**

Breeds of cattle- milk breeds- draft breeds- Dairy and Dairy products

### **Unit – III:**

#### **Culture:**

Vermiculture, Apiculture, Pisciculture and Poultry

### **Unit – IV**

#### **Communicable and non-communicable diseases**

Tuberculosis and Typhoid; Hepatitis (A and B), AIDS, Gonorrhoea and Syphilis

Diseases of respiratory system- Asthma, Bronchitis.

Oral Cancer - cause/causative agents, symptoms, diagnostics, precaution /prevention and remedy.

### **Unit – V**

#### **Non – Communicable Diseases**

Stress related disorders

Hypertension, Diabetes type II, anxiety, insomnia, migraine, depression (cause, symptoms, precaution and remedy)

### **Suggested Readings**

1. P. S. Verma and V.K.Agarwal., Concept of Ecology (Environmental biology), S.Chand & Co.Ltd., New Delhi 2004.
2. Odum E.P., Fundamentals of Ecology,Sauders Publication; Indian Edition, Nataraj Publication; Dehradun,1998.
3. G.S.Shukla., V.B.Upadhy., Economic Zoology. Rastogi Publications, 2006
4. P.G. Fenemore Manual. Silkworm Rearing. FAO Agricultural Service Bulletin,
5. Medical Biochemistry- Ambika Shanmugam.

**Practical : Animal and Human Welfare Practical**

**(For Botany and Chemistry Main)**

**Paper Code UZOP 125**

1. Study of animals in Nature/National park
2. Study of various breeds of cattle.
3. Visit to a Fish culture pond.
4. Study of Apiculture.
5. Identification of parasites related to syllabus

**QUESTION PAPER PATTERN FOR THEORY**  
**(MAIN AND ALLIED)**

**Time : 3 Hours**

**Max. Marks : 75**

**Each question paper consists of 3 Section - A, B & C**

**Section - A**

$10 \times 2 = 20$

Answer All questions.  
All questions carry equal marks.

**Section - B**

$5 \times 5 = 25$

Answer any 5 questions.  
Either (or) Pattern.

**Section - C**

$3 \times 10 = 30$

Answer any 3 out of 5 questions.  
Open Choice Pattern

## **QUESTION PAPER PATTERN FOR PRACTICALS**

**(MAIN AND ALLIED)**

Time : 3 hours

Max Marks : 35

I. Question 1. Major practical (12 Marks)

II. Question 2 . Minor practical (6 Marks)

III . Question 3. Spotters ( 4 X 3 = 12) (12 Marks)

IV. Record (5 Marks)