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.

DISTRIBUTION OF MARKS:

THEORY **Total : 100 Marks Duration : 3 hours**

UNIVERSITY EXAMINATION : **75** marks

Continuous Internal Assessment (CIA) : **25** marks

Continuous Internal Assessment Structure:

Test - **15** marks (best of 3)
Assignment - **5** marks
Attendance - **5** marks

Passing minimum for Continuous Internal Assessment - **10** marks (40%)
Passing minimum for University Examination - **30** marks (40 %)

PRACTICALS **Total : 50 Marks**
UNIVERSITY EXAMINATION : **35** marks

Continuous Internal Assessment (CIA) : **15** marks

Continuous Internal Assessment Structure:

Test : 5 marks (best of 3)
Regularity in Record Submission : 5 marks
Practical Attendance : 5 marks

Passing minimum for Continuous Internal Assessment : 6 marks (40%)
Passing minimum for University Examination : 14 mark(40%)

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 ALLOTED	
			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)

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
SEMESTER-I						**CIA**	**Univ. Exam**	**Total**	
1	Language	Paper-1	6	3	Bengali/Hindi/Malayalam/ Sanskrit/Tamil/Telugu	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
SEMESTER-II						**CIA**	**Univ. Exam**	**Total**	
8	Language	Paper-2	6	3	Bengali/Hindi/Malayalam/ Sanskrit/Tamil/Telugu	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
SEMESTER-III						**CIA**	**Univ. Exam**	**Total**	
15	Language	Paper-3	6	3	Bengali/Hindi/Malayalam/ Sanskrit/Tamil/Telugu	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
SEMESTER-IV						**CIA**	**Univ. Exam**	**Total**	
22	Language	Paper-4	6	3	Bengali/Hindi/Malayalam/ Sanskrit/Tamil/Telugu	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
SEMESTER-V						CIA	Univ. Exam	Total	
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
SEMESTER-VI						**CIA**	**Univ. Exam**	**Total**	
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 lumbricoidus*

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; *Penaeus 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 dition(Reprint), Rastogi Publications, Meerut – 250 002.

2. Ayyar, E.K. and T.N. Ananthakrishnan, 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 Reproducyive system

II. MOUNTING

7. Earth worm- Body setae and Penial setae

8. Mouth parts of Mosquito9. 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. Penaeus
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. *Penaeus* – 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, 7th Edition, Times Merror/Mosby College Publication. St. Louis. 1065pp.

SECOND SEMESTER

Core Paper Practical : BIO DIVERSITY OF CHORDATES AND VERTEBRATES

Paper Code: UZOP 124

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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 fish*e
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 [Co2 and O2) - 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 N2 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; fumication, 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 0f 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

Hempiteran 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, Phithirus 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 charecterstics 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-4th 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. 4th edition. Tata Mc Graw hill Publishing company.
4. **Ramnik Sood,M.D.(2006).** Medical laboratory Techniques-5th 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, 4th 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. Seperation 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, Flourescence 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 : Venerial 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 awreness 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, Mackeral, 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 Jersy

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 2nd 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 palaentological. 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 polycon, 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, 1st 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 date (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 charecterstics of Invertebrata, Chordata and Vertebrata

UNIT II

Protozan 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 Echionodermata, 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 adaptqation. Aquatic mammals and placenta in Mammals.

Suggested Readings

1. Ekambaranatha Ayyar, M and Ananthakrishnan, 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 Zology – 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, Gonorrhea 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 x 2 = 20

Answer All questions.
All questions carry equal marks.

Section - B 5 x 5 = 25

Answer any 5 questions.
Either (or) Pattern.

Section - C 3 x 10 = 30

Answer any 3 out 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)