SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA

(An autonomous college in the jurisdiction of Krishna University)

DEPARTMENT OF ZOOLOGY

ZOOLOGY	**ZOOT11A**	**2020-21**	**B.Sc., BZC**

SEMESTER- I **NO OF HOURS: 60**

Course - I

ONLINE: 36 Hours OFFLINE: 24 Hours CREDITS: 04

ANIMAL DIVERSITY - BIOLOGY OF NON-CHORDATES (NEW SYLLABUS)

UNIT – I (13 HOURS)

1.0. PROTOZOA AND PORIFERA ONLINE

1.1. Introduction to Non-chordates – Origin of metazoans **1 Hour**

1.2. Type study: *Polystomella* (structure and life cycle) **2 Hours**

1.3. Locomotion in protozoans **2 Hours**

1.4. Nutrition in protozoans **2 Hours**

1.5. Type study: *Sycon* (Structure, histology and skeleton) **4 Hours**

1.6. Canal system in sponges **2 Hours**

UNIT – II (10 HOURS)

2.0. CNIDARIA AND CTENOPHORA ONLINE

2.1. Type study: *Obelia*. (Structure – polyp and medusa and life cycle) **4 Hours**

2.2. Polymorphism in cnidarians**.** **2 Hours**

2.3. Corals and coral reefs **2 Hours**

2.4. Ctenophora (structure and affinities) **2 Hours**

UNIT – III (17 HOURS)

3.0. HELMINTHES AND ANNELIDA

3.1. Type study: *Fasciola hepatica* (Structure, reproduction, life cycle and pathogenicity) **4 Hours**

3.2. Parasitic adaptations in helminths **2 Hours**

3.3. Type study: *Ascaris lumbricoides* (Structure, reproduction, life cycle and pathogenicity) **ONLINE 4 Hours**

3.4. Type study: *Hirudineria* (Structure, circulatory, excretory and reproductive systems) **5 Hours**

3.5. Coelom and coelomoducts in annelids **2 Hours**

UNIT – IV (14 HOURS)

4.0. ARTHROPODA AND MOLLUSCA

4.1. Structural affinities of Onycophora **2 Hours**

4.2. Type study: *Macrobrachium rosenbergii* (Structure, appendages and Respiratory system) **4 Hours**

4.3. Economic importance of insects (Beneficial – Lac insect, honey bee, *Bombyx mori* and Lady bird; Harmful – house fly, mosquito, locust and bedbug) 2 Hours

4.4. Metamorphosis in insects 2 Hours

4.5. Pearl formation in mollusca 2 Hours

4.6. Torsion in gastropods **2 Hours**

UNIT – V (6 HOURS)

5.0. ECHINODERMATA AND HEMICHORDATA

5.1. Water-vascular system **2 Hours**

5.2. Echinoderm larvae **2 Hours**

5.3. *Balanoglossus* - Structure and affinities **2 Hours**

TEXTBOOKS

1. **R.L. Kotpal**, *Modern Text Book of Zoology - Invertebrates*.
2. **P.S. Dhami and J.K. Dhami** *Invertebrate Zoology*.

SUGGESTED READINGS

1. **L.H. Hyman**, '*The Invertebrates' Vol I, II and V*. – M.C. Graw Hill Company Ltd.
2. **Ruppert, Fox and Barnes**, *Invertebrate Zoology - A Functional Evolutionary Approach* - Thomas Publishers. Indian Edition.
3. **E.L. Jordan and P.S. Verma** '*Invertebrate Zoology'* S. Chand and Company.
4. **R.D. Barnes** '*Invertebrate Zoology'* by: W.B. Saunders CO., 1986.
5. **Barrington. E.J.W**. *'Invertebrate Structure and Function'* by ELBS.
6. **Sedgwick. A**. *'A Student Text Book of Zoology' Vol-I, II and III* – Central Book Depot, Allahabad.
7. **Parker.T.J. & Haswell** *'A Text Book of Zoology'* by, W.A., Mac Millan Co. London.

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOP11A	2020-21	B.Sc., BZC

PRACTICAL- I (At the end of I Semester)

ANIMAL DIVERSITY - BIOLOGY OF NONCHORDATES (NEW SYLLABUS)

No of Hours: 30 **Credits: 01**

General characters and classification of the following phyla and sub-phyla up to classes with suitable examples: Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata and Hemichordata.

SPOTTERS

Porífera: *Euspongia, Spongilla, Sycon.*
Cnidaria: *Physalia, Velella, Arelia, Gorgonia, Pennatula.*
Annelida: *Nereis, Heteronereis, Aphrodite, Hirudineria.*
Arthropoda: *Scylla, Macrobrachium*, *Scolopendra, Sacculina, Limulus, Scorpion, Peripatus.*
Mollusca: *Chiton, Murex, Unio, Sepia, Loligo, Octopus, Nautilus*.
Echinodermata: *Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon.*
Hemichordata: *Balanoglossus*

SLIDES

Protozoa: *Elphidium, Paramecium, Paramecium* - Binary fission and conjugation, *Vorticella, Entamoeba histolytica, Plasmodium vivax*
Porifera: T.S and L.S. of *Sycon*, spicules, gemmule
Cnidaria: *Obelia* colony and medusa,
Platyhelminthes: *Planaria, Fasciola hepatica*, *Fasciola* larval forms (Miracidium, Redia, Cercaria) *Echinococcus granulosus, Taenia solium*
Nematoda: *Ascaris lumbricoides (*male and female)**,** *Ancylostoma duodenale* (male and female), *Dracunculus, Wuchereria*
Annelida: Trochophore larva
Arthropoda: Mouthparts of housefly, butter fly, male and female *Anopheles* and *Culex,* Crustacean larvae *(*nauplius, mysis, zoea*)*
Mollusca: Glochidium larva
Echinodermata: Bipinnaria larva
Hemichordata: **T**ornaria larva

DEMONSTRATION OF DISSECTIONS

1. Prawn: Nervous system
Mounting of statocyst
Mounting of appendages

2. Mounting of Insect mouth parts

- Animal Album to be submitted at the time of practical examination
- Laboratory Record Book to be submitted at the time of practical examination

Suggested Manuals

1. Practical Zoology- Invertebrates — S.S.Lal
2. Practical Zoology - Invertebrates — P.S.Verma
3. Practical Zoology — K.P.Kurl

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA : VIJAYAWADA-10

An autonomous college in the jurisdiction of Krishna University : Machilipatnam

ZOOLOGY	ZOOT21A	2020-21	B.Sc., BZC

SEMESTER- II **NO OF HOURS: 60** **Course - II**
ONLINE: 36 Hours **OFFLINE: 24 Hours** **CREDITS: 04**

ANIMAL DIVERSITY – BIOLOGY OF CHORDATES (NEW SYLLABUS)

UNIT I (8 HOURS)

1.1. Protochordates to cyclostomes ONLINE

1.2. Protochordates

1.1.1 Salient features of **Urochordata** and **Cephalochordata** **1 Hour**

1.1.2. Structure and life-history of *Herdmania*, **2 Hours**

1.1.3. Significance of retrogressive metamorphosis. **2 Hours**

1.2. General organization of vertebrates **1 Hour**

1.3. General characters of cyclostomes **1 Hour**

1.4. Comparison of *Petromyzon* and *Myxine* **1 Hour**

UNIT II (13 HOURS)

2.0 Fishes ONLINE

2.1. Type study – *Scoliodon* - Morphology, respiratory, circulatory, excretory and nervous systems and sense organs. **8 Hours**

2.2. Migration in fishes **1 Hour**

2.3. Viviparity in fishes **1 Hour**

2.4. Types of scales **1 Hour**

2.5. Accessory respiratory organs in fishes **2 Hours**

UNIT III (12 HOURS)

3.0. Amphibia

3.1. South Indian Amphibians. **ONLINE** **1 Hour**

3.2. Type study - *Rana*: Morphology, digestive system, respiratory system circulatory system, excretory system, nervous system and reproductive system **9 Hours**

3.3. Parental care in amphibians **ONLINE** **1 Hour**

UNIT IV (11 HOURS)

4.0. Reptilia

4.1. South Indian Chelonians. **2 Hours**

4.2. Type study – *Calotes*: Morphology, digestive, respiratory, circulatory, urinogenital and nervous systems. **8 Hours**

4.3. Identification of poisonous snakes **1 Hour**

UNIT V (17 HOURS)

5.0. Aves and Mammalia

5.1. Aves

5.1.1 Birds as Glorified Reptiles. **2 Hours**

5.1.2. Type study-Pigeon (*Columbialivia*): Exoskeleton, respiratory, circulatory and excretory systems **7 Hours**

5.1.3. Significance of migration in birds **2 Hours**

5.1.4. Flight adaptations in birds **2 Hours**

5.2. Mammalia

5.2.1. Aquatic Mammals **2 Hours**

5.2.2. Dentition in Mammals. **2 Hours**

TEXTBOOKS

1. **Kotpal. R.L**. *Modern Textbook of Vertebrates*, Rastogi Publications, Third ed
2. **Dhami.P.S. and J.K. Dhami**, *Chordate Zoology*, 5thed,

SUGGESTED READINGS

1. **E.L.Jordan and P.S. Verma** '*Chordate Zoology'* -. S. Chand Publications.
2. **Mohan P.Arora**. '*Chordata – I*, Himalaya Publishing House Pvt. Ltd.
3. **Marshal, Parker and Haswell** '*Text book of Vertebrates*'. ELBS and McMillan, England.
4. **Alfred Sherwood Romer**. Thomas S. Pearson '*The Vertebrate Body*, Sixth edition, CBS college Publishing, Saunders College Publishing
5. **George C. Kent, Robert K. Carr**. *Comparative Anatomy of the Vertebrates*, 9th ed. McGraw Hill.
6. **Kenneth Kardong** *Vertebrates: Comparative Anatomy, Function and Evolution*, 4thed, 'McGraw Hill.
7. **J.W. Young**, *The Life of Vertebrates*, 3rded, Oxford University press.
8. **Harvey Pough F, Christine M. Janis, B. Heiser,** *Vertebrate Life,* Pearson, 6thed, Pearson Education Inc.2002.

ZOOLOGY	ZOOP21A	2020-21	B.Sc., BZC

PRACTICAL- II (At the end of II Semester)

ANIMAL DIVERSITY - BIOLOGY OF CHORDATES

NEW SYLLABUS

No of Hours: 30 **Credits: 01**

I DEMONSTRATION OF DISSECTIONS

- Mounting of fish scales**.**
- *Channa:* Digestive system
- *Scoliodon:* V, VII, IX and X cranial nerves

II. SPECIMENS

1. **Protochordata:** *Herdmania, Amphioxus.*
   Slides: *Amphioxus* T.S through pharynx.
2. **Cyclostomata:** *Petromyzon, Myxine*.
3. **Pisces:** *Pristis, Torpedo, Channa, Pleuronectes, Labeo, Catla, Hippocampus, Exocoetus, Echeneis, Clarias, Anguilla.*
   Slides: Fish scales.
4. **Amphibia:** *Ichthyophis, Amblystoma, Siren,* Axolotl larva*, Hyla, Rhacophorus.*
5. **Reptilia***:* *Trionyx, Testudo, Draco, Chamaeleon, Uromastix, Daboia (=Vipera) russelli, Naja, Enhydrina, Bungarus, Crocodilus*.
6. **Aves**: *Psittacula, Bubo, Alcedo, Passer, Eudynamis, Corvus*
   Different types of feathers- quill, contour, filoplume and down.
7. **Mammalia:** *Ornithorhynchus, Didelphys, Pteropus, Funambulus, Manis, Erinaceus.*

III. OSTEOLOGY

Appendicular skeleton of *Varanus, Gallus and Oryctolagus* - limbs and girdles.

SUGGESTED MANUALS

1. Practical Zoology – Vertebrata - S.S.Lal
2. A manual of Practical Zoology – Chordata P.S.Verma

ZOOLOGY	ZOOT31A	2021-2022	B.Sc., BZC

SEMESTER- III **NO OF HOURS: 60** **Course - III**

ONLINE: 36 Hours **OFFLINE: 24 Hours** **CREDITS: 04**

BIOMOLECULES, GENETICS, MOLECULAR BIOLOGY, ORGANIC EVOLUTION AND ANIMAL BEHAVIOUR (NEW SYLLABUS)

UNIT I (11 HOURS)

1.0. Biomolecules

1.1. Carbohydrates - Classification of carbohydrates; Structure of glucose **3 Hours**

1.2. Proteins - Classification of proteins; General properties of amino acids **2 Hours**

1.3. Lipids - Classification of lipids **1 Hour**

1.4. Nucleic acids

1.4.1. Deoxyribo Nucleic Acid - Structure, replication **3 Hours**

1.4.2. Ribo Nucleic Acid - Structure, types **2 Hours**

UNIT II (15 HOURS)

2.0. Genetics

2.1. Mendel's laws–Law of segregation and independent assortment (animal examples) **2 Hours**

2.2. Linkage and crossing-over **2 Hours**

2.3. Gene interactions (Incomplete dominance. Co-dominance, lethal genes, Epistasis & Pleiotropy) **3 Hours**

2.4. Genetic code and properties of genetic code **2 Hours**

2.5. DNA damage and repair **2 Hours**

2.6. Human karyotyping and amniocentesis **2 Hours**

2.7. Autosomal and allosomal disorders (Klinefelter syndrome, Turner Syndrome, Down syndrome, Phenylketonuria, Alkaptonuria & Sickle cell anaemia) **2 Hours**

UNIT III (6 HOURS)

3.0. Molecular Biology

3.1. Central dogma of molecular biology **1 Hour**

3.2. Transcription in prokaryotes -Initiation, Elongation and Termination, Post- transcriptional modifications (basics) **2 Hours**

3.3. Translation – Initiation, Elongation and Termination **1 Hour**

3.4. Gene Expression in prokaryotes (Lac Operon) **1 Hour**

3.5. Gene Expression in eukaryotes **1 Hour**

UNIT IV (12 HOURS)

4.0. Organic Evolution

4.1. Hardy-Weinberg hypothesis **2 Hours**

4.2. Modern synthetic theory of evolution **2 Hours**

4.3. Variations **1 Hour**

4.4. Isolating mechanisms **2 Hours**

4.5. Types of natural selection (directional, stabilizing & disruptive) **1 Hour**

4.6. Artificial selection **1 Hour**

4.7. Speciation – allopatry and sympatry. **1 Hour**

4.8. Microevolution vs Macroevolution (Example: Darwin finches) **2 Hours**

UNIT V (16 HOURS)

5.0 Animal Behaviour

5.1. Ethology and its branches. **1 Hour**

5.2. Concepts of Ethology (motivation, fixed action patterns, releasers, learning) **6 Hours**

5.3. Biological clocks **1 Hour**

5.4. Biological rhythms (Circadian rhythms, Circalunar rhythms and Circannular rhythms **2 Hours**

5.5. Social Behaviour in Insects (Honey bees) and Apes, Altruism **3 Hours**

5.6. Sexual behaviour in animals (Intra sexual selection & Inter sexual selection) **1 Hour**

5.7. Colouration & Mimicry **2 Hours**

Suggested Readings

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H. Freeman and company New York..
2. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
3. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
4. Peter Volpe, E. Understanding Evolution, 5th ed, Universal book stall, New Delhi.
5. Neil A. Cambel., Jane B. Reece. 'Biology, 7th ed, Cimmings'
6. Monroe W. Stickberger. 'Evolution.' 4th ed, James and Bartlett Publishers, Bostan.
7. U. Sathyanarayana and U. Chakrapani, Biochemistry.

Textbooks

1. Mohan P. Arora. 'Molecular Biology' by Himalaya Publishing House. Pvt. Ltd
   Veerabala Rastogi, 'Evolutionary Biology', Kedarnath Ramnath

---

CO-CURRICULAR ACTIVITIES (SUGGESTED)

- Chart on structures of biomolecules/types of amino acids (essential and non-essential)
- Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity
- Observation of blood group inheritance in students, from their parents and grand parents
- Karyotyping and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Model of t RNA and translation mechanism
- Power point presentation of transcription or any other topic by students
- Draw geological time scale and highlight important events along the time line
- Chart on industrial melanism to teach directed selection, Darwin's finches to teach genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA: VIJAYAWADA-10

An autonomous college in the jurisdiction of Krishna University: Machilipatnam

PRACTICAL- III (At the end of III Semester)

BIOMOLECULES, GENETICS, MOLECULAR BIOLOGY, ORGANIC EVOLUTION AND ANIMAL BEHAVIOUR

(NEW SYLLABUS)

No of Hours: 30 **Credits: 01**

WEF: 2021-2022

I. Genetics

1. A, B, O blood typing. Problems based on Blood grouping.
2. Karyotyping of human chromosomes [Human karyotype figure on paper should be cut in to different sets of chromosomes and students are asked to arrange them in an order and comment on the ideogram]
3. Identification of genetic syndromes given on charts.
4. Problems based on Mendelian inheritance [at least one problem for each of Mendel's laws].
5. Study of linkage recombination, gene mapping using the data
6. Pedigree Analysis

II. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin finches (pictures)
5. Visit to natural history museum and submission of report

III . Animal Behaviour

1. **Protective behaviour**
   - Protective colouration in *Octopus*
   - Protective behavior in *Sepia*
   - Protective behaviour in *Chamaeleon*
   - Protective behaviour in *Manis*
1. **Social behaviour**
   - Social insects- honey bees and white ants
   - Parental care in fishes (Hippocampus)
   - Parental care in amphibians (*Ichthyophys, Alytes*)
   - Migration in fishes (*Anguilla* & *Hilsa)*
2. **Nesting behaviour**
   - Spider web
   - Bee hive
   - Bird nests

4. Submission of a mini project on Animal Behaviour (05 marks)

Suggested Manuals

1. Genetics Laboratory Manual - Earnst Brown Babcock, Julius Lloyd Collins
2. Genetics Laboratory Investigations - Thomas L Mertens, Robert L.Hammersmith.

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOT12A	2020-21	B.Sc., AZC

SEMESTER- I **PAPER- I**

ANIMAL DIVERSITY – NON - CHORDATES AND CHORDATES

NEW SYLLABUS

NO. OF HOURS: 60 **CREDITS: 04**

ONLINE: 36 HOURS **OFFLINE: 24 HOURS**

UNIT –I (15 HOURS) ONLINE

1.1. Protozoa: General characters **1 Hour**

1.2. Porifera: General characters, Skelton in Sponges, Canal system in sponges **4 Hours**

1.3. Coelenterata: General characters, Polymorphism in coelenterates

1.4. Corals and Coral reef formation **5 Hours**

1.5. Platyhelminthes General Characters **1 Hour**

1.6. Nematyhelminthes: General Characters **1 Hour**

1.7. Annelida: General characters **1 Hour**

1.8. *Peripatus* - Structure and affinities **2 Hours**

UNIT – II (17 Hours) ONLINE

2.1. Arthropoda: General characters **1 Hour**

2.2. Classification of Crustacea **1 Hour**

2.3. Type Study: *L.vennamei* **9 Hours**

2.4. Mollusca: General characters Pearl formation in pelecypods **2 Hours**

2.5. Echinodermata: General characters, Water vascular system (starfish) **2 Hours**

2.6. Hemichordata: General characters, *Balanoglossus* affinities **2 Hours**

UNIT – III (9 HOURS)

3.1. General characters of Prochordata and Chordata **2 Hours**

3.2. General characters of Cyclosotamata **1 Hour**

3.3. Comparison of the *Petromyzon* and *Myxine* **1 Hour**

3.4. General characters of Fishes, Migration in Fishes, Types of Scales, Dipnoi **5 Hours**

UNIT – IV (12 HOURS)

4.1. Type study: *Labeo rohita* **6 Hours**

4.2. Type study**:** *Channa punctatus* (Food and feeding, digestive system and reproductive system) **ONLINE** **4 Hours**

4.3. General characters of Amphibia **1 Hour**

4.4. General characters of Reptilia **1 Hour**

UNIT –V (7 HOURS)

5.1. General characters of Aves **1 Hour**

5.2. Flight adaptation in birds **2 Hours**

5.3. General characters of Mammalia **1 Hour**

5.4. Aquatic mammals **1 Hour**

5.5. Dentition in mammals **2 Hours**

TEXT BOOKS

•R.L. Kotpal Modern Text Book of Zoology - Invertebrates.

•P.S. Dhami and J.K. Dhami – Invertebrate Zoology

•Kotpal. R.L.- Modern Textbook of Vertebrates, Rastogi Publications, Third Ed.

•Dhami.P.S. and J.K. Dhami - Chordate Zoology, 5th Ed.,

SUGGESTED READINGS

- **L.H. Hyman** '*The Invertebrates' Vol I, II and V.* – McGraw Hill Company Ltd.
- **Ruppert, Fox and Barnes**, *Invertebrate Zoology* - A Functional Evolutionary Approach. Thomas publishers. Indian Edition.
- **E.L. Jordan and P.S.Verma** '*Invertebrate Zoology'* S. Chand and Company.
- **R.D. Barnes** '*Invertebrate Zoology'* by: W.B. Saunders CO., 1986.
- **Barrington. E.J.W**., '*Invertebrate Structure and Function'* by ELBS.
- **Sedgwick. A.** *'A Student Text Book of Zoology'* Vol-I, II and III – Central Book Depot, Allahabad.
- **Parker.T.J. and Haswell** '*A Text Book of Zoology'* - W.A., MacMillan Co. London.
- **E.L.Jordan and P.S. Verma** '*Chordate Zoology'* -. S. Chand Publications.
- **Mohan P.Arora**. '*Chordata – I*, Himalaya Publishing House Pvt. Ltd.
- **Marshal, Parker and Haswell** '*Text book of Vertebrates*'. ELBS and McMillan, England.
- **Alfred Sherwood Romer and Thomas S. Pearson** '*The Vertebrate Body*,6th Ed, CBS College Publishing, Saunders College Publishing
- **George C. Kent, Robert K. Carr**. *Comparative Anatomy of the Vertebrates*, 9th Ed. McGraw Hill.
- **Kenneth Kardong** *Vertebrates: Comparative Anatomy, Function and Evolution*, 4th Ed, McGraw Hill.
- **J.W. Young**, *The Life of Vertebrates*, 3rd Ed, Oxford University Press.
- **Harvey Pough F, Christine M. Janis, B. Heiser,** *Vertebrate Life,* Pearson, 6th Ed, Pearson Education Inc.2002.

***

CO-CURRICULAR ACTIVITIES

- Clay models of canal system in sponges
- Visit to adopted village and conducting awareness campaign on diseases to people as part of Social Responsibility.
- Plaster-of-paris or Thermocol model of *Peripatus*
- Manufacture of manure by students and donating to local people
- Chart on pearl forming layers using clay or Thermocol

- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Preparation of charts depicting the feeding mechanism, 3 coeloms, tornaria larva etc., of *Balanoglossus*
- Preparation of charts on Chordate classification (with representative animal photos)
- Visit to local fish market and identification of local cartilaginous and bony fishes
- Maintaining of aquarium by students
- Thermocol model of fish heart and brain
- Preparation of slides of scales of fishes
- Visit to local/nearby river to identify migratory fishes and prepare study notes
- Collection of bird feathers and submission of report on Plumology
- Map pointing of prototherian and metatherian mammals
- Chart preparation for dentition in mammals

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	**ZOOP12A**	**2020-21**	**B.Sc., AZC**

SEMESTER- I **PRACTICAL – I**

ANIMAL DIVERSITY – NON-CHORDATES & CHORDATES (NEW SYLLABUS)

NO OF HOURS: 30 **CREDITS: 01**

LEARNING OUTCOMES:

By the end of the course students will be able to

1. Understand the importance of preservation of museum specimens
2. Identify animals based on special identifying characters
3. Understand different organ systems through demo or virtual dissections
4. Maintain a neat, labelled record of identified museum specimens
5. Exhibit the hidden creative talent

Observation of the following slides / spotters / models

Protozoa	:	*Elphidium, Paramecium* - Binary fission and conjugation
Porifera	:	*Spongilla, Euspongia, Sycon, Sycon* - T.S and L.S
Coelenterata	:	*Obelia* - colony and medusa,
Platyhelminthes	:	*Planaria,*
Nematyhelminthes	:	*Ascaris* - male and female, *Ancylostoma duodenale* – male and female
Annelida	:	*Nereis, Heteronereis,*
Arthropoda	:	*Scolopendra, Sacculina, Limulus, Peripatus*
Mollusca	:	*Chiton, Murex, Sepia, Octopus, Nautilus,*
Echinodermata	:	*Ophiothrix, Echinus, Antedon, Asterias,* Bipinnaria larva
Hemichordata	:	*Balanoglossus,*
Protochordata	:	*Herdmania, Amphioxus, Amphioxus* T.S through pharynx
Cyclostomata	:	*Petromyzon, Myxine*
Pisces	:	*Pristis, Torpedo, Hippocampus, Exocoetus, Eheneis, Catla, Clarius,* Placoid scale, Cycloid scale, Ctenoid scale
Amphibia	:	*Ichthyophis, Amblystoma,*
Reptilia	:	*Draco, Chemaeleon, Vipera russelli, Naja, Bungarus, Enhydrina, Testudo, Trionyx, Crocodilus*
Aves	:	*Passer, Columba, Corvus, Pavo,* Study of different types of feathers - Quill, Contour, Filoplume and down
Mammalia	:	*Ornithorthynchus, Tachyglossus,*

Demonstration of dissection / dissected / virtual dissection:

1. Prawn - Digestive system

1. Shark - V, VII, IX & X cranial nerves

Suggested manuals

1. Practical Zoology- Invertebrates — S.S.Lal
2. Practical Zoology - Invertebrates — P.S.Verma
3. Practical Zoology — K.P.Kurl
4. Practical Zoology – Vertebrata — S.S.Lal
5. A manual of Practical Zoology – Chordata — P.S.Verma

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	**ZOOT22A**	**2020-21**	**B.Sc., AZC**

SEMESTER- II **Course – II**

CELL BIOLOGY, CELLULAR METABOLISM, GENETICS AND MOLECULAR BIOLOGY

NEW SYLLABUS

NO OF HOURS: 60 **CREDITS: 04**

ONLINE: 36 Hours OFFLINE: 24 Hours

UNIT I (17 HOURS) ONLINE

1.0. Cell Biology

1.1. Prokaryotic and eukaryotic cells, virus, viroids, mycoplasma **3 Hours**

1.2. Electron microscopic structure of animal cell. **2 Hours**

1.3. Plasma membrane –Models and transport functions. **2 Hours**

1.4. Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes **3 Hours**

1.5. Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes **7 Hours**

UNIT II (11 HOURS) ONLINE

2.0. Cellular Metabolism – I (Biomolecules)

2.1. Carbohydrates - Classification of carbohydrates; Structure of glucose **3 Hours**

2.2. Proteins - Classification of proteins; General properties of amino acids **2 Hours**

2.3. Lipids - Classification of lipids **1 Hour**

2.4. Nucleic acids

2.4.1. Deoxyribo Nucleic Acid - Structure, replication **3 Hours**

2.4.2. Ribo Nucleic Acid - Structure, types **2 Hours**

UNIT III (6 HOURS) ONLINE

3.0. Cellular Metabolism – II

3.1. Carbohydrate metabolism – Glycogen metabolism, Gluconeogenesis **2 Hours**

3.2. Lipid Metabolism – β-oxidation of palmitic acid **2 Hours**

3.3. Protein metabolism - Transamination, Deamination and Urea Cycle **2 Hours**

UNIT IV (17 HOURS)

4.0. Genetics

4.1. Mendel's laws–Law of segregation and independent assortment (animal examples) **2 Hours**

4.2. Linkage and crossing-over **ONLINE** **2 Hours**

4.3. Gene interactions (Incomplete dominance. Co-dominance, lethal genes, Epistasis & Pleiotropy) **3 Hours**

4.4. Multiple alleles with the examples of blood typing **2 Hours**

4.5. Genetic code and properties of genetic code **2 Hours**

4.6. DNA damage and repair **2 Hours**

4.7. Human karyotyping and amniocentesis **2 Hours**

4.8. Autosomal and allosomal disorders (Klinefelter syndrome, Turner Syndrome, Down syndrome, Phenylketonuria, Alkaptonuria & Sickle cell anaemia)

2Hours

UNIT V 9 HOURS

5.0. Molecular Biology

5.1. Central dogma of Molecular Biology **1 Hour**

5.2. Transcription in prokaryotes –

5.2.1. Initiation, Elongation and Termination **2 Hours**

5.2.2. Post- transcriptional modifications (basics) **1 Hour**

5.3. Translation – Initiation, Elongation and Termination **1 Hour**

5.4. Gene Expression in prokaryotes (Lac Operon) **2 Hours**

5.5. Gene Expression in eukaryotes **2 Hours**

TEXTBOOKS

1. Mohan P. Arora. 'Molecular Biology' by Himalaya Publishing House. Pvt. Ltd
2. Gupta P.K., 'Genetics

SUGGESTED READINGS

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H. Freeman and company New York.
2. Cell Biology by De Robertis
3. Bruce Alberts, Molecular Biology of the Cell
4. Rastogi, Cytology
5. Varma & Aggarwal, Cell Biology
6. C.B. Pawar, Cell Biology
7. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008).Principles of Genetics. VIII Edition. Wiley India.
8. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition.
10. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
11. Neil A. Campbel., Jane B. Reece. 'Biology, 7th ed, Cimmings'
12. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
13. U. Sathyanarayana and U. Chakrapani, Biochemistry
14. Molecular Biology by freifielder
15. Instant Notes in Molecular Biology by Bios scientific publishers and Viva Books Private Limited
16. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to
17. Genetic Analysis. IX Edition. W. H. Freeman and Co.

SEMESTER- II **PRACTICAL – II**

TITLE OF THE PAPER: CELL BIOLOGY, GENETICS, CELLULAR METABOLISM AND MOLECULAR BIOLOGY (NEW SYLLABUS)

NO OF HOURS: 30 **CREDITS: 01**

Cell Biology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of *Chiranomous*

I. Genetics

1. A, B, O blood typing. Problems based on Blood grouping.
2. Karyotyping of human chromosomes [Human karyotype figure on paper should be cut in to different sets of chromosomes and students are asked to arrange them in an order and comment on the ideogram]
3. Identification of genetic syndromes given on charts.
4. Problems based on Mendelian inheritance [at least one problem for each of Mendel's laws].
5. Study of linkage recombination, gene mapping using the data
6. Pedigree Analysis

III. Cellular Metabolism

1. Estimation of total proteins in given solutions by Lowry's method.
2. Estimation of total carbohydrate by Anthrone method.
3. Qualitative tests for identification of ammonia, urea and uric acid

SUGGESTED MANUALS

1. A Manual of Practical Zoology – Chordates P.S.Verma
2. Practical Zoology -Vertebrates S.S.Lal
3. Genetics Laboratory Manual- Earnst Brown Babcock, Julius Lloyd Collins
4. Genetics Laboratory Investigations -Thomas L Mertens, Robert L Hammersmith.
5. Medical Laboratory Technology - Dr. RamnikSood
6. Laboratory Manual for Practical Biochemistry -Shivaraja Shankara Y.M

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	**ZOOT32A**	**2021-22**	**B.Sc., AZC**

SEMESTER- III **PAPER- III**

EMBRYOLOGY AND ANIMAL PHYSIOLOGY(NEW SYLLABUS)

NO OF HOURS: 60 **CREDITS: 04**

UNIT – I (10 HOURS)

1.0 Embryology - I

1.1. Spermatogenesis, oogenesis and Fertilization. **4 Hours**

1.2. Types of eggs **1 Hour**

1.3. Types of cleavages **2 Hours**

1.4. Development of frog up to gastrulation and formation of primary germ layers **3 Hours**

UNIT – II (11 HOURS)

2.0. Embryology - II

2.1. Formation and significance of primitive streak in chick embryo **1 Hour**

2.2. Structure of 24 hours, 33 hours and 48 hours chick embryos **6 Hours**

2.3. Foetal membranes and their significance in chick embryo **2 Hours**

2.4. Placenta in mammals: types and functions **2 Hours**

UNIT – III (15 HOURS)

3.0. Physiology – I

3.1. Digestive system:

1.1.1. Process of digestion **1 Hour**

1.1.2. Digestion of proteins **1 Hour**

1.1.3. Digestion of carbohydrates **1 Hour**

1.1.4. Digestion of lipids **1 Hour**

1.1.5. Digestion of cellulose **2 Hours**

1.1.6. Absorption of digested food **1 Hour**

3.2. Respiratory system –

1.2.1. Pulmonary ventilation **1 Hour**

1.2.2. Transport of oxygen and Carbon dioxide **3 Hours**

1.2.3. Respiratory pigments **1 Hour**

3.3. Circulatory system –

3.3.1. Structure and functioning of heart **2 Hours**

3.3.2. Cardiac cycle. **1 Hour**

UNIT – IV (12 HOURS)

4.0 Physiology - II

4.1. Excretory system –

4.1.1. Structure of nephron **1 Hour**

4.1.2. Physiology of urine formation **2 Hours**

4.1.3. Counter current mechanism **1 Hour**

4.1.4. Classification of animals basing on excretory products (ammonotelic, ureotelic and uricotelic) **1 Hour**

4.2. Nervous system

4.2.1. Types and Structure of neuron **1 Hour**

4.2.2. Nerve impulse - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibres **3 Hours**

4.2.3. Structure of Synapse **1 Hour**

4.2.4. Synaptic transmission (Electrical and chemical) **2 Hours**

UNIT – V (12 HOURS)

5.0. Physiology - III

5.1. Muscle contraction –

5.1.1. Ultra-structure of muscle fibre **1 Hour**

5.1.2. Molecular and chemical basis of muscle contraction **2 Hours**

5.2. Endocrine glands –

5.2.1. Structure, secretions and the functions (of hormones) of Hypothalamus, pituitary, thyroid, parathyroid, adrenal glands and pancreas **7 Hours**

5.2.2. Hormonal control of reproduction in human beings **2 Hours**

TEXTBOOKS

1. **A.K. Berry,** A Text Book of Animal Physiology, Delhi

SUGGESTED READINGS

1. **Balinisky B.I.** *An introduction to Embryology*, **5thed, Thompson Brook, Coole**
2. **McEwen, R.S.** *Vertebrate Embryology*, **Oxford and IBH Publishing Co. New Delhi.**
3. **Gerard J. Tortora and Sandra Reynolds Garbowski** *Principles of Anatomy and Physiology*, Tenth Ed., John Wiley & Sons
4. **Arthur C. Guyton MD**, *A Text Book of Medical Physiology,* Eleventh ed., John E. Hall, Harcourt Asia Ltd.
5. **William F. Ganong**, *A Review of Medical Physiology*, 22 Ed, McGraw Hill, 2005
6. **Sherwood, Klandrof, Yanc,** *Animal Physiology*, Thompson Brooks/Coole, 2005.
7. **Sherwood, Klandrof, Yanc,** *Human Physiology*, Thompson Brooks/Coole, 2005.
8. **Knut Scmidt-Nielson,** *Animal Physiology*, 5thed, Cambridge Low Price Edition.
9. **Roger Eckert and Randal,** *Animal Physiology*, 4thed, Freeman Co, New York.

SRI DURGA MALLESWARA SIDDHARTHA MAHILA KALASALA, VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	**ZOOP32A**	**2021-22**	**B.Sc., AZC**

SEMESTER- III **PRACTICAL - III**

TITLE OF THE PAPER: EMBRYOLOGY AND ANIMAL PHYSIOLOGY

NEW SYLLABUS

NO OF HOURS: 30 **CREDITS: 01**

WEF: 2020-2021

Embryology

1. Study of T.S. of testis and T.S. of ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Frog – blastula and gastrula
4. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

Animal Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Qualitative tests for identification of ammonia, urea and uric acid
3. Estimation of haemoglobin
4. Blood cell counting: RBC, WBC and differential cell count
4. Study of activity of salivary amylase under optimum conditions
5. Unit oxygen consumption in aquatic animals (fish or crab or frog).
6. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, bone, cartilage, smooth muscle, striated muscle and cardiac muscle of a mammal

SUGGESTED MMANUALS

1. A Manual of Practical Zoology – Chordates P.S.Verma
2. Practical Zoology -Vertebrates S.S.Lal

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOT01	2020-21	B.Sc., AZC

SEMESTER- III **PAPER- IV**

TITLE: AQUATIC ECOLOGY, ORGANIC EVOLUTION AND ANIMAL BEHAVIOUR

NEW SYLLABUS

NO OF HOURS: 60 **CREDITS: 04**

WEF: 2021-2022

UNIT – I 15 HOURS

1.0. Aquatic Ecology - I

1.1. Definition, nature and scope of ecology **1 Hour**

1.2. Physical and chemical factors of an ecosystem

1.2.1. Pressure **1 Hour**

1.2.2. Atmospheric gases: oxygen and carbon dioxide. **2 Hours**

1.2.3. Water **1 Hour**

1.3. Classification of Aquatic Ecosystems

1.3.1. Marine ecosystem **1 Hour**

1.3.2. Estuarine ecosystem **1 Hour**

1.3.3. Freshwater ecosystem **1 Hour**

1.4. Structure of functions of pond ecosystem **1 Hour**

1.5. Trophic Dynamics of Ecosystem

1.5.1. Energy flow, food chains and food web, trophic levels, ecological pyramids **2 Hours**

1.5.2. Nutrient Cycles in Culture Ponds – Phosphorus, Carbon and Nitrogen **2 Hours**

1.6. Concepts of Productivity, estimation and improvement of productivity **2 Hours**

UNIT – II 14 HOURS

2.0. Aquatic Ecology - II

2.1. Population Ecology

2.1.1. Characteristics of animal populations **2 Hours**

2.1.2. Population regulation **1 Hour**

2.2. Animal communities

2.2.1. Characteristics of biotic community **1 Hour**

2.2.2. Ecotone and edge effect **1 Hour**

2.2.3. Community interactions **2 Hours**

2.3. Habitat Ecology and adaptations

3.4.1. Ecological habitat and niche **1 Hour**

3.4.2. Pelagic adaptations **2 Hours**

3.4.3. Deep sea adaptations **1 Hour**

2.4. Zoogeography

2.4.1. Zoogeographical realms **1 Hour**

2.4.2. Geography of freshwater fishes **1 Hour**

2.4.3. Geography of marine fishes **1 Hour**

UNIT III (15 HOURS)

5.0. Organic Evolution

5.1. Hardy-Weinberg hypothesis **2 Hours**

5.2. Modern synthetic theory of evolution **2 Hours**

5.3. Variations **1 Hours**

5.4. Isolating mechanisms **2 Hours**

5.5. Natural selection (Industrial melanism) **1 Hour**

5.6. Types of natural selection (directional, stabilizing & disruptive) **2 Hours**

5.7. Artificial selection **1 Hour**

5.8. Speciation – allopatry and sympatry. **2 Hours**

5.9. Microevolution Vs Macroevolution (Example: Darwin's finches) **2 Hours**

UNIT - IV 7 HOURS

4.0 Animal Behaviour – I

4.1. Ethology and its branches. **1 hour**

4.2. Concepts of Ethology (motivation, fixed action patterns, releasers, learning) **6 hours**

UNIT - V 9 HOURS

5.0 Animal Behavior - II

5.1. Biological clocks **1 hour**

5.2.	Circadian rhythms	**1 hour**
5.3.	Circalunar rhythms	**1 hour**
5.4.	Circannular rhythms	**1 hour**
5.5.	Social behavior in Insects (Honey bees) and Apes, Altruism	**2 hours**
5.6.	Sexual behavior in animals (Intra sexual selection & Inter sexual selection)	**1 hour**
5.7.	Coloration & Mimicry	**2 hours**

TEXT BOOKS

1. Chapman, V.J. 1977. Ecosystems of the World. Vol. I. Wet Coastal Ecosystems. Elsevier, New York.

2. Krattiger, F., Jeferey, A. Mcneely & Others. 1971. Widening Perspectives on Biodiversity. Nataraj Publishers, Dehra Dun.

3. Levinton, Jeffrey S. 1995. Marine Biology: Function, Biodiversity, Ecology. Oxford University Press Oxford.

SUGGESTED READINGS

1. Nair, Balakrishnan, N. and Thampy, D.M. 1980. *A Text Book of Marine Ecology* The Macmillan Company of India Limited, Delhi.

2. Boaden, Patric J.S. and Raymond Seed. 1985. *An Introduction to Coastal Ecology*. Blackie, Glasgow and London.

3. Odum, Eugene P. 1971. *Fundamentals of Ecology*. Third Edition. Nataraj Publishers Dehra Dun.

SEMESTER- III **PRACTICAL- IV**

TITLE: AQUATIC ECOLOGY, ORGANIC EVOLUTION AND ANIMAL BEHAVIOUR

NEW SYLLABUS

NO OF HOURS: 30 **CREDITS: 01**

WEF: 2021-2022

I. Aquatic Ecology

1. Determination of CO2 of given sample.
2. Estimation of Chlorides of given sample.
3. Estimation of Total Hardness of given sample.
4. Estimation of Phophates of given sample.

II. Organic Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin finches (pictures)
5. Visit to natural history museum and submission of report

III. Animal Behaviour

1. **Protective behaviour**
   - Protective colouration in *Octopus*
   - Protective behavior in *Sepia*
   - Protective behaviour in *Chamaeleon*
   - Protective behaviour in *Manis*

II. Social behaviour

- Social insects- honey bees and white ants
- Parental care in fishes (Hippocampus)
- Parental care in amphibians (*Ichthyophys*)
- Migration in fishes (*Anguilla* & *Hilsa)*

III. Nesting behaviour

- Spider web
- Bee hive
- Bird nests

4. Submission of a mini project on Animal behavior (10 marks)

SUGGESTED MANUALS

BSC III YEAR PRACTCAL MANUAL FOR AQUACULTURE BY TECHNICAL PUBLISHERS

GENETICS MANUAL – EARNST BROWN BABCOCK, JULIUS LLOYD COLLINS

SEMESTER- III Paper-III No of Credits:4

BIOMOLECULES, GENETICS, ORGANIC EVOLUTION AND ANIMAL BEHAVIOUR

UNIT I

1.1 Biomolecules **12Hrs**

1.2 Carbohydrates - Classification of carbohydrates Structure of glucose

1.3 Proteins - Classification of proteins General properties of amino acids

1.4 Lipids - Classification of lipids

1.5 Nucleic acids

1.5.1 Deoxyribo Nucleic Acid - Structure, replication

1.5.2 Ribo Nucleic Acid - Structure, types

UNIT II 15Hrs

2.1. Genetics

2.2. Mendel's laws–Law of segregation and independent assortment(animal examples

2.3. Linkage and crossing-over

2.4. Gene interactions (Incomplete dominance. Co-dominance, lethal genes, Epistasis & Pleiotropy)

2.5. Genetic code and properties of genetic code

2.6. DNA damage and repair

2.7. Human karyotyping and amniocentesis

2.8. Autosomal and allosomal disorders (Klinefelter syndrome, Turner Syndrome, Down syndrome, Phenylketonuria, Alkaptonuria & Sickle cell anaemia)

UNIT III 14Hrs

3.0. **Organic Evolution**

3.1. Hardy-Weinberg hypothesis

3.2. Modern synthetic theory of evolution

3.3Variations

3.4Isolating mechanisms

3.5Natural selection (Industrial melanism)

3.6Types of natural selection (directional, stabilizing & disruptive)

3.7Artificial selection

3.8Speciation – allopatry and sympatry.

3.9. Microevolution vs Macroevolution (Example: Darwin finches)

UNIT IV 9Hrs

4.0**Animal Behaviour - I**

4.1Ethology and its branches.

4.2Concepts of Ethology (motivation, fixed action patterns, releasers, learning)

UNIT V 10Hrs

5.0**Animal Behaviour - II**

5.1.Biological clocks

5.2. Circadian rhythms

5.3. Circalunar rhythms

5.4. Circannular rhythms

5.5 Social Behaviour in Insects (Honey bees)and Apes, Altruism

5.6. Sexual behaviour in animals (Intra sexual selection & Inter sexual selection)

5.7. Colouration & Mimicry

Suggested Readings

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H. Freeman and company New York..
2. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
3. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
4. Peter Volpe, E. Understanding Evolution, 5th ed, Universal book stall, New Delhi.
5. Neil A. Cambel., Jane B. Reece. 'Biology, 7th ed, Cimmings'
6. Monroe W. Stickberger. 'Evolution.' 4th ed, James and Bartlett Publishers, Bostan.
7. U. Sathyanarayana and U. Chakrapani, Biochemistry.

Textbooks

1. Mohan P. Arora. 'Molecular Biology' by Himalaya Publishing House. Pvt. Ltd
Veerabala Rastogi, 'Evolutionary Biology', Kedarnath Ramnath

ZOOLOGY	ZOO P31	2016-17 2017-18 2018-19	B.SC(BZC)

SEMESTER- III Paper-III No of Credits:2

PRACTICAL- III (At the end of III Semester) 45Hrs

BIO MOLECULES, GENETICS, EVOLUTIONAND ANIMAL BEHAVIOUR

I. Genetics

1. A, B, O blood typing. Problems based on Blood grouping.
2. Karyotyping of human chromosomes [Human karyotype figure on paper should be cut in to different sets of chromosomes and students are asked to arrange them in an order and comment on the ideogram]
3. Identification of genetic syndromes given on charts.
4. Problems based on Mendelian inheritance [at least one problem for each of Mendel's laws].
5. Study of linkage recombination, gene mapping using the data

II. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Darwin finches (pictures)
5. Visit to natural history museum and submission of report

III. Animal Behaviour

1. Protective behaviour

- Protective colouration in Octopus
- Protective behavior in Sepia
- Protective behaviour in Chamaeleon
- Protective behaviour in Manis

2. Social behaviour

- Social insects- honey bees and white ants
- Parental care in fishes (Hippocampus)
- Parental care in amphibians (Ichthyophys, Alytes)
- Migration in fishes(Anguilla & Hilsa)

3. Nesting behaviour

- Spider web
- Bee hive
- Bird nests

ZOOLOGY	ZOO T41	2016-17	B.SC(BZC)
		2017-18	
		2018-19	

SEMESTER- IV Paper-IV No of Credits:4

EMBRYOLOGY, ANIMAL PHYSIOLOGY AND ECOLOGY

UNIT I 14Hrs

1.1. Embryology
1.2. Spermatogenesis, oogenesis and Fertilization.
1.3. Types of eggs
1.4. Types of cleavages
1.5. Development of frog up to gastrulation and formation of primary germlayers
1.6. Foetal membranes and their significance in chick embryo
1.7. Placenta in mammals: types and functions

UNIT II 14Hrs

2.1 Physiology - I
2.2 Digestive system: process of digestion
2.3 Absorption of digested food
2.4 Respiratory system - Pulmonary ventilation, transport of oxygen and Carbondioxide
2.5 Circulatory system - Structure and functioning of heart, Cardiac cycle.
2.6 Excretory system - Structure of nephron, urine formation, and counter current Mechanism

Unit-III 12Hrs

3.0 Physiology - II

3.1.1 Nerve impulse -Resting membrane potential, origin and propogation of action potentials along myelinated and non myelinated nerve fibres
3.1.2 Muscle contraction - Ultra structure of muscle fibre, molecular and chemical basis of muscle contraction
3.1.3 Endocrine glands - Structure, secretions and the functions (of hormones) of pituitary, thyroid, parathyroid, adrenal glands and pancreas
3.1.4 Hormonal control of reproduction in human being

UNIT IV 11Hrs

4.1. Ecology I

4.2. Physical and chemical factors of an ecosystem

4.2.1. Pressure

4.2.2. Atmospheric gases: oxygen and carbon dioxide.

4.2 Functional aspects of an ecosystem

4.2.1. Biogeochemical cycles: nitrogen cycle, phosphorus cycle and carbon cycle

4.3 Animal communities

4.3.1 Types of communities

4.3.2. Community structure

4.3.3. Ecotone and edge effect,

4.4 Community interactions

4.4.1 Prey-predator relationships

4.4.2. Competition

UNIT V 9Hrs

5.0. Ecology - II

5.1 Habitat Ecology and adaptations

5.1.1. Ecological habitat and niche

5.1.2. Desert adaptations

5.1.3. Pelagic adaptations

5.2. Population Ecology

5.2.1. Characteristics of animal populations

5.3. Zoogeography

5.3.1 Zoogeographical regions: Study of physical and faunal peculiarities of Oriental, Australian and Ethiopian regions.

Suggested Readings

1. **Gerard J. Tortora and Sandra Reynolds Garbowski**Principles of Anatomy and Physiology, Tenth Ed., John Wiley & Sons
2. **Arthur C. Guyton MD**, A Text Book of Medical Physiology, Eleventh ed., John E. Hall, Harcourt Asia Ltd.
3. **William F. Ganong**, A Review of Medical Physiology, 22 ed, McGraw Hill, 2005
4. **Sherwood, Klandrof, Yanc,** Animal Physiology, Thompson Brooks/Coole, 2005.
5. **Sherwood, Klandrof, Yanc,**Human Physiology, Thompson Brooks/Coole, 2005.
6. **Knut Scmidt-Nielson,** Animal Physiology**,** 5thed, Cambridge Low Price Edition.
7. **Roger Eckert and Randal,** Animal Physiology**,** 4thed, Freeman Co, New York**.**
8. **Balinisky B.I.**An introduction to Embryology, 5thed, Thompson Brook, Coole.
9. **McEwen, R.s. Vertebrate Embryology,** Oxford and IBH Publishing Co. New Delhi.
10. **M.P.Arora**, 'Ecology' Himalaya Publishing company.
11. **P.D.Sharma**, Environmental Biology'.
12. **P.R.Trivedi and Gurdeep Raj**. 'Environmental Ecology'
13. **BuddhadevSarma and Tej Kumar**, Indian Wildlife Threats and Preservation

14. **Chapman J.L. and Reiss M.J,** Ecology Principles and Applications, Second Ed., Cambridge University Press, London.

15. **Benny Joseph,** Environmental Studies, TATA MGraw Hill Com., New Delhi.

16. **Eugene P. Odum**, Fundamentals of Ecology Third Ed., NataraJ Publishers, Dehradun.

17. **Balinisky B.I.**An introduction to Embryology, 5thed, Thompson Brook, Coole.

18. **McEwen, R.s. Vertebrate Embryology,** Oxford and IBH Publishing Co. New Delhi.

Textbooks

1. **A.K. Berry,** A Text Book of Animal Physiology**,** Delhi

2. SubrahmanyamN.S.&. Sambamurthy A.V.S.S, Ecology, Narosa PublishingHouse,New Delhi

ZOOLOGY	ZOO P41	2016-17	B.SC(BZC)
		2017-18	
		2018-19	

SEMESTER- IV Paper-IV No of Credits:2

PRACTICAL- IV (At the end of IV Semester) 45Hrs

EMBRYOLOGY, ANIMAL PHYSIOLOGY AND ECOLOGY

I Embryology

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

II. Physiology

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Qualitative tests for identification of ammonia, urea and uric acid
3. Study of activity of salivary amylase under optimum conditions
4. Study of prepared slides of T.S. of duodenum, liver, lung, kidney, spinal cord, boneand cartilage of a mammal

III. Ecology

1. Determination of pH of given sample
2. Estimation of dissolved oxygen of given sample
3. Estimation of total alkalinity of given sample
4. Estimation of salinity of given sample

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO T51	2017-18	B.SC(BZC)
		2018-19	

SEMESTER- V Paper-V No of Credits:3

ANIMAL BIOTECHNOLOGY

UNIT - 1

1.1. Tools of Recombinant DNA technology - Enzymes and Vectors **15 Hrs**

1.2. Scope and importance of Biotechnology

1.3. Restriction modification systems:

1.3.1. Types I, II and III. Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

1.4. DNA modifying enzymes and their applications:

1.4.1. DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases

1.5. Cloning Vectors:

1.5.1. Properties of cloning vectors

1.5.2. Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 basedvectors, Cosmids,

1.5.3. Artificial chromosome vectors: BACs, YACs

UNIT - II

2.1. Techniques of Recombinant DNA technology **15 Hrs**

2.2. Cloning

2.2.1. Procedure of gene cloning, Use of linkers and adaptors

2.3. Gene delivery:

2.3.1. Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediated delivery

2.4. PCR:

2.4.1. Basics of PCR, Principle and procedure of PCR.

2.5. DNA Sequencing

2.5.1. Sanger's method of DNA sequencing- traditional and automated sequencing

2.6. Hybridization techniques:

2.6.1. Southern, Northern and Western blotting

2.7. Genomic and cDNA libraries: Preparation and uses

UNIT - III

3.1. Animal Cell Technology **10 Hrs**

3.2. Cell culture media: Natural and Synthetic

3.3. Types of Cell cultures

3.3.1. Primary culture, Protocols for Primary Cell Culture, Secondary culture

3.3.2. Continuous cell lines; Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero)

3.3.3. Organ culture; Cryopreservation of cultures.

3.4. Hybridoma Technology

3.4.1. Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

3.5. Stem cells

Types of stem cells, applications

UNIT - IV

4.1. Reproductive Technologies &Techniques in Biotechnology **10 Hrs**

4.2. Manipulation of reproduction in animals

4.2.1. Artificial Insemination, In vitro fertilization

4.2.2. Super ovulation, Embryo transfer, Embryo cloning

4.3. Transgenic Animals

4.3.1. Gene transfer;

4.3.2. Production of transgenic animals Transgenic – sheep, - fish

UNIT - V

5.1. Applied Biotechnology **10 Hrs**

5.2. Industry

5.2.1. Fermentation: Different types of Fermentation:

5.2.2. Submerged & Solidstate; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized

5.2.3. Downstream processing – Filtration, centrifugation, extraction, chromatography,Spray drying and lyophilization

5.3. r-DNA Technology

5.3.1. Insulin production, Biological control

5.3.2. Sericulture Biotechnology

5.4. Agriculture:

5.4.1. Fisheries – monoculture in fishes, polyploidy in fishes

5.4.2. DNA fingerprinting.

SUGGESTED READINGS

1. **Brown TA.** (2010). Gene Cloning and DNA Analysis. 6th edition. BlackwellPublishing, Oxford,U.K.
2. **Clark DP and Pazdernik NJ**. (2009). Biotechnology: Applying the Genetic Revolution.
   Elsevier Academic Press, USA
3. **Primrose SB and Twyman RM**. (2006). Principles of Gene Manipulation andGenomics, 7th edition. Blackwell Publishing, Oxford, U.K.
3. **Sambrook J and Russell D**. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. ColdSpring Harbor Laboratory Press
4. **Wiley JM, Sherwood LM and Woolverton CJ**. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education

6. **Brown TA**. (2007). Genomes-3. Garland Science Publishers
7. **Primrose SB and Twyman RM**. (2008). Genomics: Applications in Human Biology. Blackwell Publishing, Oxford, U.K.
8. **D.C. Darling and S.J. Morgan** Animal Cells Culture and Media, 1994.BIOS Scientific Publishers Limited.
9. **Jennie P. Mathur and David Barnes Methods in Cell Biology**, Volume 57, 1998.Animal Cell Culture Methods Academic Press.
10. **P.K. Gupta**: Biotechnology and Genomics, Rastogi publishers (2003).
11. **B.D. Singh**: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO P51	2017-18 2018-19	B.SC(BZC)

SEMESTER- V Paper-V No of Credits:2

ANIMAL BIOTECHNOLOGY --Skill Development 24Hrs

1. Genomic DNA isolation from E. coli/Fish tissue
2. Plasmid DNA isolation (pUC 18/19) from E. coli
3. Study the following techniques through photographs

a. Paper chromatography

b. Thin layer Chromatography

4. Preparation of culture media.
5. DNA quantification using agarose gel electrophoresis (by using lambda DNA as standard).
6. Amplification of DNA by PCR
7. Packing and sterilization of glass and plastic wares for cell culture.
8. Project report on animal cell culture.

SUGGESTED READINGS

1. **Ashish S. Verma, Surajt Das and Anchal Singh** Laboratory manual for Biotechnology S.Chand Publications
2. **Lesa A. Seidman and Synthia G. Moore**. Basic Laboratory methods for Biotechnology

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO T52	2017-18 2018-19	B.SC(BZC)

SEMESTER- V Paper-VI No of Credits:3

ANIMAL HUSBANDRY POULTRY -- Employability

UNIT – I **10 Hrs**

1.1. General introduction to poultry farming. Principles of poultry housing.Poultry houses. Systems of poultry farming.

1.2. Management of chicks, growers and layers. Management of Broilers

1.3. Classification of Poultry (Different Breeders-eggs/meat/dual purpose/game/ornamental).

1.4. Confirmation points of chicken (Broilers, layers)

UNIT – II 10 Hrs

2.1. Poulty feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers.

2.2. Methods of feeding: whole grain feeding system, grain and mash method, all mashmethod, pellet feeding.

2.3. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms,control and management. Vaccination schedule

UNIT – III 10 Hrs

3.1. Selection, care and handling of hatching eggs.

3.2. Eggcandling.

3.3. Methods of hatching. Brooding and rearing. Sexing of chicks.

UNIT- IV 20 Hrs

4.1. Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification ofIndian Cattle breeds, exotic breeds and Indian buffalo breeds

4.2. Systems of inbreeding and crossbreeding.

4.3. Housing of dairy animals – Selection of site for dairy farm

4.4. Systems of housing – loose, housing system. Conventional dairy barn.

4.5. Deworming and Vaccination programme. Records to be maintained in a dairy farm

4.6. Breeding policy of cattle and Buffaloes.

UNIT - V 10 Hrs

5.1. Care and management of dairy animals - Care and management of calf, heifer,milk animal, dry and pregnant animal, bulls and bullocks

5.2. Cleaning and sanitation of dairy farm. Weaning of calf. Castration anddehorning.

SUGGESTED READINGS:

1. **R.A.Singh**- Poultry Production - Kalyani Publications.
2. **Sastri, Singh, Thomas** Livestock Production Management - Kalyani Publications.
3. **G.C.Benerji** A Test Book of Animal Husbandry– Oxford Publication
4. **Jagadish Prasad** Poultry Production– Kalyani Publications

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO P52	2017-18 2018-19	B.SC(BZC)

SEMESTER- V Paper-VI No of Credits:2

PRACTICAL – VI 30Hrs

ANIMAL HUSBANDRY-- Skill Development

1. Study of various breeds of layers and broilers (photographs)
2. Identification of disease causing organisms in poultry birds (as per theory)
3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)
4. Study of various activities in a poultry farm (layers and broilers) and submission of areport.
5. Study of various breeds of cattle (photographs/microfilms)
6. Study of various activities carried out in a dairy farm and submission of a report.
7. Record to be maintained in a farm.
8. Postmortem sheet

SUGGESTED READINGS:

1. **R.A.Singh**- Poultry Production - Kalyani Publications.
2. **Sastri, Singh, Thomas** Livestock Production Management - Kalyani Publications.
3. **G.C.Benerji** A Test Book of Animal Husbandry– Oxford Publication
4. **Jagadish Prasad** Poultry Production– Kalyani Publications

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO TEL61	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(A) No of Credits:3

IMMUNOLOGY-- Employability

UNIT – I **15Hrs**

1.1 Overview of Immune system

1.1.1 Introduction to basic concepts in Immunology

1.1.2 Innate and adaptive immunity

1.2 Cells and organs of Immune system

1.2.1 Cells of immune system

1.2.2 Organs of immune system

UNIT – II 9Hrs

2.1 Antigens

2.1.1 Basic properties of antigens

2.1.2 B and T cell epitopes, haptens and adjuvants

2.1.3 Factors influencing immunogenicity

UNIT – III 8Hrs

3.1 Antibodies

3.1.1 Structure of antibody

3.1.2 Classes and functions of antibodies

3.1.3 Monoclonal antibodies

UNIT – IV 11Hrs

4.1 Working of Immune system

4.1.1 Structure and functions of major histocompatibility complexes

4.1.2 Exogenes and Endogenes pathways of antigen presentation and Processing

4.1.3 Basic properties and functions of cytokines

UNIT – V 17Hrs

5.1 Immune system in health and disease

5.1.1 Introduction to concepts of autoimmunity and immune deficiency Diseases

5.1.2 Transplantation immunology

5.1.3 Cancer Biology

5.2 Vaccines

5.2.1 General introduction to vaccines

5.2.2 Types of vaccines

SUGGESTED READINGS:

1. **Richard A. Glodsby, Thomas J Kind, Barbara A. Osborne, Janis Kubey,** Immunology, 5thed, Freeman and Co. New York
2. **Ivan Roitt,** Immunology**,** 4thed, JohanthanBrostoff, Moshy, London.
3. **C.V. Rao**. An Introduction to Immunology
4. **Nandini Shetty,** immunology, New Age International Publcations
5. **Dr. N. Armugam, Prof.Dulsy Fatima, Pro.A.Mani, Dr.L.M.Narayanan and Dr.A.M.Selvaraj,** Immunology and Micrrobiology, Saras Publications
6. **B.Annadurai,** A Text Book of Immunology and Immuno technology,S.Chand and company limited.
7. **Dr.Ramnik Sood,** Methods and Interpretation of Medical LaboratoryTechnology.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO PEL61	2017-18	B.SC(BZC)
		2018-19	

SEMESTER- VI Paper-VII(A) No of Credits:2

IMMUNOLOGY-- Skill Development 30Hrs

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of

a. ELISA Pregnancy Test HBs Ag, HCV HIV

b. Immuno electrophoresisMalarial parasite(cells) VDRL
C Latex agglutination methodsRa Factor
ASLO (Anti streptolysin O)CRP(C Reactive Protein)

SUGGESTED READINGS:

1. **Dr.Ramnik Sood,** Methods and Interpretation of Medical Laboratory Technology.
2. Laboratory manual of Immunology S.Chand Company
3. **Murphy K, Travers P, Walport M**. (2008). Janeway's Immunobiology. 7th edition Garland
Science Publishers, New York.
4. **Peakman M, and Vergani D**. (2009).Basic and Clinical Immunology. 2nd edition

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO TELS62	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(B) No of Credits:3

BIOINFORMATICS—Employability

UNIT- I

1.1. HISTORY, SCOPE AND IMPORTANCE 10 Hrs

1.2. Important contributions - aims and tasks of Bioinformatics - applications of Bioinformatics -challenges and opportunities –

1.3. Internet basics- HTML introduction to NCBI data model- Various file formatsfor biological sequences

UNIT - II

2.1. DATABASES - TOOLS AND THEIR USES 15 Hrs

2.2. Importance of databases

2.3. Biological databases-primary sequence databases; Composite sequence databases-Secondary databases- nucleic acid sequence databases - Protein sequence data bases –Structure databases - bibliographic databases

2.4. Specialized genomic resources- analysis packages

UNIT - III

3.1. SEQUENCE ALIGNMENT METHODS 15 Hrs

3.2. Sequence analysis of biological data-Significance of sequence alignment pairwise sequence

3.3. Alignment methods- Use of scoring matrices and gap penalties in sequenceAlignments

3.4. Multiplesequence alignment methods - Tools and application of multiplesequence alignment.

UNIT - IV

4.1. PREDICTIVE METHODS USING DNA AND PROTEIN SEQUENCES 10 Hrs

4.2. Gene predictions strategies - protein prediction strategies

4.3. Molecular visualization tools phylogeneticanalysis: Concept of trees-phylogenetic trees and multiple alignments.

UNIT- V

5.1. DRUG DISCOVERY PROCESS 10 Hrs

5.2. Discovering a drug - target identification and validation

5.3. Identifying the lead compound -optimization of lead compound - chemicallibraries.

SUGGESTED READINGS

1. **Pevsner J**. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.
2. **Campbell A. M., Heyer L. J**. (2006) Discovering Genomics, Proteomics and Bioinformatics.
II Edition. Benjamin Cummings.
3. A text book of Bioinformatics by Saras publication
4. **Ghosh Z. and Bibekanand M**. (2008) Bioinformatics: Principles and Applications. Oxford
University Press.
5. **D.Mount** Bioinformatics
6. **Arthur M.Lesk**, Oxford Introduction to Bioinformatics

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOPELS62	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(B) No of Credits:2

BIOINFORMATICS-- Skill Development 30Hrs

1. Introduction to Computers.
2. Hands on experience on NCBI databases
3. Sequence alignment with BLASTA and FASTA
4. Construction of Phylogenetic tree.
5. Demonstration of Protein visualization (if software available)

SUGGESTED READINGS

1. **Pevsner J**. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell.
2. **Campbell A. M., Heyer L. J**. (2006) Discovering Genomics, Proteomics and Bioinformatics.
   II Edition. Benjamin Cummings.
3. A text book of Bioinformatics by Saras publication
4. **Ghosh Z. and Bibekanand M**. (2008) Bioinformatics: Principles and Applications. Oxford
   University Press.
5. **D.Mount** Bioinformatics
6. **Arthur M.Lesk**, Oxford Introduction to Bioinformatics

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO TCLS64	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(1) No of Credits:3

CLUSTER ELECTIVE - I MEDICAL DIAGNOSTICS

CLINICAL BIOCHEMISTRY-- Employability

UNIT – I

1.1. Basic Medical Laboratory Principles and Procedures: 10 Hrs

1.2. Introduction to clinical biochemistry.

1.3. Glassware.

1.4. Solutions and Reagents - Normal, Molar, percent, buffer solutions and indicators.

1.5. Equipments and Instruments – Centrifuges, Hot air oven, Incubator, Water bath, Photometer, Spectrophotometer, Analyzers. Quality Control. Sterilization, Autoclave

UNIT – II

2.1. Clinical Biochemistry of Carbohydrates, Proteins & Lipids: 20 Hrs

2.2. Elementary classification and metabolism of carbohydrates.Properties of carbohydrates.

2.3. Regulation of blood sugar and Diabetes. Glucose Tolerance Test.Glycosylated Haemoglobin.

2.4. General classification of proteins. Structure of proteins. Summary of proteindigestion and amino acid metabolism. Determination of serum protein

2.5. General lipid metabolism. Primary and Secondary Dyslipoproteinemias.

UNIT – III

3.1. Clinical Biochemistry of Enzymes: 10 Hrs

3.2. Enzymes as catalysts. Enzyme specificity. Factors which affect enzyme activity.Coenzymes and Isoenzymes.

3.3. Enzymes classification and nomenclature. Enzymes in clinical diagnosis.Use of enzymes as reagents.

3.4. Laboratory determinations of enzymes – Clinical significance of SGOT,SGPT, S.ALP, S.ACP, Serum Amylase.

UNIT- IV

4.0. Water & Mineral Metabolism and Acid-Base Balance: 10Hrs

4.1 Body fluid distribution. Factors which influence the distribution of body water.

4.2 Mineral metabolism. Importance of the trace elements.

4.3 Flame photometry. Action of buffer systems. Disturbances in acid-base Balance

UNIT – V

5.1. Function Tests: 10 Hrs

5.2. Diseases of the kidneys. Creatine metabolism.

5.3. Bile pigment metabolism. Disordered Bilirubin metabolism. Hepatic Jaundice and Posthepatic jaundice.

5.4. Ischemic heart disease.

5.5. Clinical significance of gastric analysis.

SUGGESTED READINGS

- Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
- Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
- Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
- Robbins and Cortan, Pathologic Basis of Disease, VIII Edition.
- Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOPCLS64	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(1) No of Credits:2

CLUSTER ELECTIVE - I

MEDICAL DIAGNOSTICS-- Skill Development

- Collection of blood specimen and serum preparation.
- Colorimetry
- Blood glucose and GTT
- LFT,
- Kidney Function
- Cardiac Profile tests.
- Determination of serum Total proteins, Total, Direct & Indirect Biirubin
- Enzymatic Assays (SGOT, SGPT, S.ALP, S.ACP)
- Determination of sodium, potassium and chlorides & Calcium

SUGGESTED READINGS

1. **Godkar P.B. and Godkar D.P.** Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
2. **Cheesbrough M., A** Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOTCLS65	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(2) No of Credits:3

CLUSTER ELECTIVE - I MEDICAL DIAGNOSTICS

HAEMATOLOGY-- Employability

UNIT – I

1.1. Laboratory Preparation in Haematology: **10 Hrs**

1.2. Introduction to practical: Basic requirements.

1.3. Collection of blood. Anticoagulants and effects of anticoagulants on bloodcell morphology.

1.4. Effects of storage of blood.

UNIT – II

2.1. Routine Haematology: **15 Hrs**

2.2. Composition of blood.

2.3. Haemoglobin synthesis. Various haemoglobins.

2.4. Haemopoietic system of the body. Blood cell counts. Erythropoiesis, Leucopoiesis and development of blood corpuscles.Thrombopoiesis.

2.5. Laboratory technique of haemocytometry. Clinical significance of Total erythrocyte count,total leucocyte count, differential count, erythrocyte sedimentation rate and platelet count.

UNIT – III

3.1. Haemostasis and Haematological Diseases: **15 Hrs**

3.2. General consideration of blood coagulation. Mechanism of coagulation. Thefibrinolytic mechanism. Clinical significance of routine coagulation tests

3.3. Anaemia. Various types of anaemias – Iron deficiency anaemia, Aplastic anaemia, Perinicious anaemia, Sideroblasticanaemia and Sickel cell anaemia.

3.4. Other haematological diseases – HDNB, Thalassaemia, Leukaemia

3.5. Parasitic infections of blood – structure and life cycle of Plasmodium vivax,types of malaria, Structure and life cycle of Wuchereria bancrofti.

UNIT- IV

4.1. Automation in Haematology: **10 Hrs**

4.2. General considerations. Blood cell counters. Flow through cytochemicaldifferential counter.

4.3. Automated coagulated systems.

UNIT – V

5.1. Immunohaematology and Blood banking: **10 Hrs**

5.2. Human Blood Group Systems. Inheritance of blood group system

5.3. Blood transfusion.

SUGGESTED READINGS

1. **Park, K**. (2007), Preventive and Social Medicine, B.B. Publishers
2. **Godkar P.B. and Godkar D.P**. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
3. **Cheesbrough M.**, A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
4. **Guyton A.C. and Hall J.E**. Textbook of Medical Physiology.
5. **Robbins and Cortan**, Pathologic Basis of Disease, VIII Edition.
6. **Prakash, G**. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOPCLS65	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(2) No of Credits:3

CLUSTER ELECTIVE - I

MEDICAL DIAGNOSTICS-- Skill DevelopmentHAEMATOLOGY 30Hrs

1. Blood Collection & Anticoagulants
2. Estimation of Hemoglobin
3. Total Count of RBC, WBC & Platelets using Hemocytometry
4. Absolute Eosinophil count
5. Differential count of WBC
6. Packed cell Volume (PCV)
7. Erythrocyte Sedimentation Rate (ESR)
8. Bleeding Time & Clotting Time (BT & CT)
9. Prothrombin Time (PT)
10. Blood Grouping

SUGGESTED READINGS

1. **Godkar P.B. and Godkar D.P**. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
2. **Cheesbrough M.**, A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
3. **Guyton A.C. and Hall J.E**. Textbook of Medical Physiology.
4. **Prakash, G**. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOTCLS66	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(3) No of Credits:3

CLUSTER ELECTIVE - I MEDICAL DIAGNOSTICS

CLINICAL MICROBIOLOGY-- Employability

UNIT – I

1.1. Introduction to Clinical Microbiology: 10 Hrs

1.2. Introduction to microbiology.

1.3. Introduction to bacteriology. Classification of bacteria. Basic features of bacteria. Factorsinfluencing the growth of bacteria. Morphology of bacteria. Normal bacterial flora of the body.

1.4. Pathogenic microorganisms. Bacterial diseases

UNIT – II

2.1. Clinical Bacteriology Laboratory & Staining methods: 15 Hrs

2.2. Safe code of practice for a microbiological laboratory. Sterilization and disinfection.

2.3. Requirements in a microbiological lab. Microscopy. Automation in Bacteriology.

2.4. Introduction to Staining. Gram Staining. Acid-Fast Staining. CapsuleStaining. Transfer of bacteria.

UNIT – III

3.1. Culturing of Microorganisms and Identification of Bacteria: 15 Hrs

3.2. Composition of culture media. Different types of culture media. Preparation of culture media. Inoculation of culture media. Culturing of anaerobes and different types of culture mediaused. Use, preparation and quality control of various culture media.

3.3. Identification of bacteria – staining reactions, cultural characteristics and biochemical properties.

3.4. Study of Gram Negative Bacteria – Bacilli and Cocci. Study of Gram Positive Bacteria – Gram positive Cocci, Anaerobic bacteria, study of genus – Bacillus and Corynebacterium Study of Mycobacteria, Spirocahetes and Rickettsia

UNIT- IV

4.1. Clinical Mycology and Virology: 10 Hrs

4.2. Basic morphological classification of clinically important fungi.

4.3. Parasitic fungi – Superficial Mycoses and Dermatophytes, Subcutaneous Mycoses, Intermediate Superficial Deep Mycoses and Deep or Systemic mycoses. Classificationbased on symptomatology.

4.4. Some important viruses and related diseases (Measles viruses, Influenza viruses, Rotaviruses, Polioviruses, Herpes viruses, Rabies viruses, Hepatitis viruses, General transmission routes for viruses.

UNIT – V

5.1. Diagnostic Serology: 10 Hrs

5.2. General view of immune system. Antibodies. Harmful effect of immunity.Autoimmune diseases.

5.3. Principles of Serodiagnostic tests - Flocculation test, Aggluination test, Slideagglutination test, Tube agglutination test, Complement test, Microtitration test, Precipitin test and ELISA.

SUGGESTED READINGS

1. **Park, K.** (2007), Preventive and Social Medicine, B.B. Publishers
2. **Godkar P.B. and Godkar D.P**. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
3. **Cheesbrough M.**, A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
4. **Guyton A.C. and Hall J.E**. Textbook of Medical Physiology.
5. **Robbins and Cortan**, Pathologic Basis of Disease, VIII Edition.
6. **Prakash, G.** (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOOPCLS66	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VII(3) No of Credits:3

CLUSTER ELECTIVE - I

MEDICAL DIAGNOSTICS-- Employability CLINICAL MICROBIOLOGY 30Hrs

1. Sterilization(Autoclave & Hot air oven)
2. Types of Culture Media(Preparation of Nutrient Broth, Nutrient Agar)
3. Specimen collection & preparation ,inoculation of sample
4. Culture of Bacteria
5. Grams Staining
6. ZN Staining
7. Hanging drop Preparation
8. Antibiotic sensitivity test
9. Examination of some Permanent Bacterial slides

PROJECT WORK

Associated with a Clinical Diagnostic Laboratory.

ZOOLOGY	ZOOTCL61	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VIII(1) No of Credits:3

CLUSTER ELECTIVE - IIAQUACULTURE

PRINCIPLES OF AQUACULTURE-- Employability

UNIT– I

1.1. Introduction / Basics of Aquaculture

1.1.1. Definition, Significance and History of Aquaculture

1.1.2. Present status of Aquaculture – Global and National scenario

1.1.3. Major cultivable species for aquaculture: freshwater, brackish water andmarine.

1.1.4. Criteria for the selection of species for culture

UNIT – II

2.1. Types of Aquaculture

2.1.1. Freshwater, Brackish water and Marine

2.1.2. Concept of Monoculture, Polyculture, Composite culture, Monosex cultureand Integrated fish farming

2.2. Culture systems

2.2.1. Ponds, Raceways, Cages, Pens, Rafts and water recirculating systems,Biofloc Technology

2.3. Culture practices

2.3.1. Traditional, extensive, modified extensive, semi-intensive and intensivecultures of fish and shrimp.

UNIT – III

3.1. Design and construction of aqua farms

3.1.1. Criteria for the selection of site for freshwater and brackish water pondfarms

3.1.2. Design and construction of fish and shrimp farms

3.2. Seed resources

3.2.1. Natural seed resources and Procurement of seed for stocking: Carpand shrimp

3.3. Nutrition and feeds

3.3.1. Nutritional requirements of a cultivable fish and shellfish

3.3.2. Natural food and Artificial feeds and their importance in fish and shrimpculture

UNIT – IV

4.1. Management of carp culture ponds

4.1.1. Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization; Stocking management – Stocking density and stocking; Post- stocking

management – Feeding, water quality, growth and health care; and Harvesting ofponds

4.2. Culture of giant freshwater prawn, Macrobrachium rosenbergii

UNIT – V

5.1. Culture of shrimp (Penaeus monodon or Litopenaeus vannamei)

5.2. Culture of pearl oysters

5.3. Culture of seaweeds-species cultured, culture techniques, important by-products, prospects

5.4. Culture of ornamental fishes – Setting up and maintenance of aquarium; and breeding.

SUGGESTED READINGS

1. **Bardach, JE et al.** 1972. Aquaculture – The farming and husbandry of freshwater andmarine organisms, John Wiley & Sons, New York.
2. **Bose AN et al**.1991. Coastal aquaculture Engineering. Oxford & IBH Publ.Co.Pvt.Ltd.
3. **Chakraborty C & Sadhu AK**. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn.Daya Publ. House.
4. FAO. 2007. Manual on Freshwater Prawn Farming.
5. **Huet J.** 1986. A text Book of Fish Culture. Fishing News Books Ltd.
6. ICAR. 2006. Hand Book of Fisheries and Aquaculture. ICAR.
7. **Ivar LO.** 2007. Aquaculture Engineering. Daya Publ. House.
8. **Jhingran V.G**. 2007. Fish and Fisheries of India. Hindustan Publ. Corporation, India.
9. **Landau M.** 1992. Introduction to Aquaculture. John Wiley & Sons.
10. **Lovell RT.**1998. Nutrition and Feeding of fishes. Chapman & Hall.
11. **Mcvey JP.** 1983. Handbook of Mariculture. CRC Press.
12. MPEDA: Handbooks on culture of carp, shrimp, etc.
13. New MB. 2000. Freshwater Prawn Farming. CRC Publ.
14. **Pillay TVR**.1990. Aquaculture- Principles and Practices, Fishing News Books Ltd., London.
15. **Pillay TVR & Kutty MN**. 2005. Aquaculture- Principles and Practices. 2nd Ed. Blackwell
16. **Rath RK.** 2000. Freshwater Aquaculture. Scientific Publ.
14. **Stickney RR**. 1979. Principles of Warmwater Fish Culture, John Wiley & Sons
15. **Wheaton FW**. 1977. Aquacultural Engineering. John Wiley & Sons.

ZOOLOGY	ZOO PCL61	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VIII(1) No of Credits:2

CLUSTER ELECTIVE - II AQUACULTURE30Hrs

PRINCIPLES OF AQUACULTURE- Skill DevelopmentCultivable fishes

1. Identification and study of important cultivable and edible fishes - Any ten
2. Identification and study of important cultivable and edible crustaceans - Any five
3. Identification and study of common aquarium fishes – Any five
4. General description and recording biometric data of a given fish.

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures
2. External examination of the diseased fish – diagnostic features and procedure.
3. Autopsy of fish – Examination of the internal organs.
4. Determination of dosages of chemicals and drugs for treating common diseases.

SUGGESTED READINGS

1. **Chakraborty C & Sadhu AK.** 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn. Daya Publ. House.
2. FAO. 2007. Manual on Freshwater Prawn Farming.
3. ICAR. 2006. Hand Book of Fisheries and Aquaculture. ICAR.
4. **Lovell RT**.1998. Nutrition and Feeding of fishes. Chapman & Hall.
5. **Mcvey JP**. 1983. Handbook of Mariculture. CRC Press.
6. MPEDA: Handbooks on culture of carp, shrimp, etc.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO TCL62	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VIII(2) No of Credits:3

CLUSTER ELECTIVE - IIAQUACULTURE

AQUACULTURE MANAGEMENT-- Employability

UNIT – I

1.1. Breeding and Hatchery Management

1.1.1. Bundh Breeding and Induced breeding of carp by Hypophysation; anduse of synthetic hormones

1.1.2. Types of fish hatcheries; Hatchery management of Indian major carps

1.1.3. Breeding and Hatchery management of Penaeus monodon / Litopenaeusvannamei

1.1.4. Breeding and Hatchery management of giant freshwater prawn.

UNIT – II

2.1. Water quality Management

2.1.1. Water quality and soil characteristics suitable for fish and shrimp culture

2.1.2. Identification of oxygen depletion problems and control mechanisms inCulture ponds

2.1.3. Aeration: Principles of aeration and Emergency aeration

2.1.4. Liming materials, Organic manures and Inorganic fertilizers commonly used and their implications in fish ponds

2.1.5. Pond Automation

UNIT – III

3.1. Feed Management

3.1.1. Live Foods and their role in shrimp larval nutrition.

3.1.2. Supplementary feeds: Principal foods in artificial diets; Types offeeds; Feed additives and Preservatives; role of probiotics.

3.1.3. Feed formulation and manufacturing; Feed storage

3.1.4. Feeding strategies: Auto feed dispenses, feeding schedules and ration size; Feed evaluation- feed conversion efficiencies and ratios

UNIT – IV

4.1. Disease Management

4.1.1. Principles of disease diagnosis and health management;

4.1.2. Prophylaxis, Hygiene and Therapy of fish diseases

4.1.3. Specific and non-specific defense systems in fish; Fish immunization andvaccination
4.1.4. Etiology, Symptoms, prophylaxis and therapy of common fish diseases infish ponds
4.1.5. Etiology, Symptoms, prophylaxis and therapy of common shrimp diseases inshrimp ponds

UNIT – V

5.1. Economics and Marketing

5.1.1. Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis
5.1.2. Fish marketing methods in India; Basic concepts in demand and price analysis

5.2. Fisheries Extension

5.2.1. Fisheries Training and Education in India; Role of extension incommunity development.

5.3. FishGenetics

5.3.1. Genetic improvement of fish stocks – Hybridization of fish.
5.3.2. Gynogenesis, Androgenesis, Polyploidy, Transgenic fish, Cryopreservation of gametes, Production of monosex and sterile fishesand their significance in aquaculture. Brood bank

SUGGESTED READINGS

1. **Boyd CE.** 1979. Water Quality in Warm Water Fish Ponds. Auburn University
2. **Boyd, CE**. 1982. Water Quality Management for Pond Fish Culture. Elsevier Sci. Publ. Co.
3. Chakraborty C & Sadhu AK. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn. Daya Publ. House
4. Conroy CA and Herman RL. 1968. Text book of Fish Diseases. TFH (Great Britain) Ltd, England. 5HalverJ & Hardy RW. 2002. Fish Nutrition. Academic Press.
6. Ian C. 1984. Marketing in Fisheries and Aquaculture. Fishing News Books.
7. ICAR. 2006. Handbook of Fisheries and Aquaculture. ICAR.
8. **Jhingran VG.** 2007. Fish and Fisheries of India. Hindustan Publishing Corporation, India.
9. **Jhingran VG & Pullin RSV**. 1985. Hatchery Manual for the Common, Chinese and IndianMajor Carps.ICLARM, Philippines.
10. **Kumar D**. 1996. Aquaculture Extension Services Review: India. FAO Fisheries CircularNo.906, Rome.
11. **Lavens P & Sorgeloos P**. 1996. Manual on the Production and Use of Live Food forAquaculture. FAO Fisheries Tech. Paper 361, FAO.
12. MPEDA. 1993. Handbook on Aqua Farming - Live Feed. Micro Algal Culture. MPEDAPublication
13. New MB. 1987. Feed and Feeding of Fish and Shrimp. A Manual on the Preparation andPreservation of Compound Feeds for Shrimp and Fish in Aquaculture. FAO – ADCP/REP/87/26
14. **Pandian TJ, Strüssmann CA & Marian MP**. 2005. Fish Genetics and AquacultureBiotechnology. Science Publ.
15. **Pilley, TVR & Dill, WMA**. 1979. Advances in Aquaculture. Fishing News Books, Ltd.England.
16. **Pillay TVR & Kutty MN**. 2005. Aquaculture- Principles and Practices. Blackwell.
17. **Ray GL**. 2006. Extension, Communication and Management. 6th Ed. Kalyani Publ. Delhi.
18. **Reddy PVGK**, AyyappanS, Thampy DM & Gopalakrishna 2005.Text Book of Fish Geneticsand Biotechnol.ICAR
19. **Reichenbach KH.** 1965. Fish Pathology. TFH (Gt. Britain) Ltd, England.
20. **Shang YC**. 1990. Aquaculture Economic Analysis - An Introduction. World Aquaculture Society, USA.
21. **Singh B.** 2006. Marine Biotechnology and Aquculture Development. Daya Publ. House
22. **Stickney RR.** 1979. Principles of Warm water Aquaculture. John-Willey & sons Inc.
23. **Swain P, Sahoo PK & Ayyappan S**. 2005. Fish and Shellfish Immunology: An Introduction.Narendra Publ.
24. **Thomas PC, Rath SC &Mohapatra KD**.2003.Breeding and Seed Production of Finfishand Shellfish. Daya Publ.

ZOOLOGY	ZOOPCL62	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VIII(2) No of Credits:2

CLUSTER ELECTIVE - IIAQUACULTURE

AQUACULTURE MANAGEMENT-- Skill DevelopmentPond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample;
2. Estimation of dissolved oxygen, free carbon dioxide, total alkalinity, totalhardness, phosphates and nitrites.
3. Soil analysis – Determination of soil texture, pH, conductivity, available nitrogen, available phosphorus and organic carbon.
4. Identification and study of common zooplankton, aquatic insects and aquatic weeds –Each 5

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed
3. Estimation of Proximate composition of aquaculture feeds – Proteins, carbohydrates,lipids, moisture, ash content.
4. Gut content analysis to study artificial and natural food intake.

SUGGESTED READINGS

1. **Boyd, CE.** 1982. Water Quality Management for Pond Fish Culture. Elsevier Sci. Publ.Co.
2. Chakraborty C & Sadhu AK. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn. Daya Publ. House
3. Conroy CA and Herman RL. 1968. Text book of Fish Diseases. TFH (Great Britain) Ltd,England.5 Halver J & Hardy RW. 2002. Fish Nutrition. Academic Press.
4. ICAR. 2006. Handbook of Fisheries and Aquaculture. ICAR.
5. **Jhingran VG & Pullin RSV**. 1985. Hatchery Manual for the Common, Chinese andIndian Major Carps. ICLARM, Philippines.
6. **Lavens P & Sorgeloos P**. 1996. Manual on the Production and Use of Live Food for Aquaculture.FAO Fisheries Tech. Paper 361, FAO.
7. MPEDA. 1993. Handbook on Aqua Farming - Live Feed. Micro Algal Culture. MPEDA Publication

ZOOLOGY	ZOO TCL63	2017-18	B.SC(BZC)
		2018-19	

SEMESTER- VI Paper-VIII(3) No of Credits:3

CLUSTER ELECTIVE - IIAQUACULTURE

POSTHARVEST TECHNOLOGY-- Employability

UNIT – I 10Hrs

1.1. Handling and Principles of fish Preservation

1.1.1. Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage inmarine fish and freshwaterfish

1.1.2. Principles of preservation – cleaning, lowering of temperature, raising of temperature, denudation, use of salt, use of fish preservatives, exposure tolow radiation of gamma rays

UNIT – II 10Hrs

2.1. Methods of fish Preservation

2.1.1. Traditional methods - sun drying, salt curing, pickling and smoking.

2.1.2. Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

UNIT – III 20Hrs

3.1. Processing and preservation of fish and fish by-products

3.1.1. Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet foodfrom trash fish, fish manure.

3.1.2. Fish by-products – fish glue, ising glass, chitosan, pearl essence, sharkfins, fish leather and fish maws.

3.2. Seaweed Products

3.2.1. Preparation of agar, algin and carrageen. Use of seaweeds as food for human consumption, in disease treatment and preparation of therapeutic drugs.

UNIT – IV

4.1. Sanitation and Quality control 10Hrs

4.2.1. Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

4.2.2. Quality Control of fish and fishery products – pre-processing control, controlduring processing and control after processing.

4.2. Regulatory affairs in industries- CAA, FWA, HACCP

UNIT – V 10Hrs

5.1. Quality Assurance, Management and Certification

5.1.1. Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety

5.1.2. National and International standards – ISO 9000: 2000 Series of Quality Assurance System, Codex Alimentarius. Code of conduct in responsiblefisherman (CCRF

SUGGESTED READINGS

1. **Balachandran KK**. 2001. Post-harvest Technology of Fish and Fish Products. DayaPubl.
2. **Bond, et al**. 1971. Fish Inspection and Quality Control. Fishing News Books, England.
3. **Clucas IJ.** 1981. Fish Handling, Preservation and Processing in the Tropics. Parts I, II. FAO.
4. **Gopakumar K**. (Ed.). 2002. Text Book of Fish Processing Technology. ICAR.
5. **Govindan, TK**.1985. Fish Processing Technology, Oxford-IBH.
6. **Hall GM**. (Ed). 1992. Fish Processing Technology. Blackie.
7. **Huss HH, Jakobsen M & Liston J**. 1991. Quality Assurance in the Fish Industry. Elsevier.
8. **John DEV**. 1985. Food Safety and Toxicity. CRC Press.
9. **Krenzer R**. 1971. Fish Inspection and Quality Control. Fishing News.
10. **Larousse J & Brown BE**. 1997. Food Canning Technology. Wiley VCH.
11. **Nambudiri DD**. 2006. Technology of Fishery Products. Fishing Chimes.
12. **Regenssein JM &Regenssein CE**.1991. Introduction to Fish Technology.VanNostrand Reinhold.
13. **Rudolf K.** 1969. Freezing and Irradiation of Fish. Fishing News (Books).
14. **Sen DP**. 2005. Advances in Fish Processing Technology. Allied Publ.

SRI DURGA MALLESWARASIDDHARTHA MAHILA KALASALA: VIJAYAWADA.

(An Autonomous college in the jurisdiction of Krishna University)

ZOOLOGY	ZOO PCL63	2017-18 2018-19	B.SC(BZC)

SEMESTER- VI Paper-VIII(3) No of Credits:2

CLUSTER ELECTIVE - II

AQUACULTURE-- Skill Development POSTHARVEST TECHNOLOGY 30Hrs

Post-harvest Technology

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products, examination of salt, protein, moisture in dried / cured products, examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
3. Preparation of isinglass, collagen and chitosan from shrimp and crab shell. ?
4. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet, plan form and corrective action procedures in processing of fish.

Project Work

Visit to a fish breeding centre / fish farms and submit a project report or
Visit to a feed manufacturing unit and submit a project report or
Visit to a shrimp hatchery / shrimp farms and submit a project report or
Visit to a shrimp processing unit and submit a project report

REFERENCE BOOKS

1. **Balachandran KK**. 2001. Post-harvest Technology of Fish and Fish Products. Daya Publ.
2. **Bond, et al.** 1971. Fish Inspection and Quality Control. Fishing News Books, England.
3 **Clucas IJ.** 1981. Fish Handling, Preservation and Processing in the Tropics. Parts I, II.FAO.
4. **Gopakumar K**. (Ed.). 2002. Text Book of Fish Processing Technology. ICAR.
5. **Govindan, TK**.1985.Fish Processing Technology, Oxford-IBH.
6. **Hall GM.** (Ed). 1992. Fish Processing Technology. Blackie.
7. **Huss HH, Jakobsen M & Liston J.** 1991.Quality Assurance in the Fish Industry. Elsevier.
8. **John DEV.** 1985. Food Safety and Toxicity. CRC Press.
9. **Sen DP**. 2005. Advances in Fish Processing Technology. Allied Publ.