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PAPER – I : ANIMAL DIVERSITY – BIOLOGY OF NON-CHORDATES

Max.Marks:100

Class	Semester	Title of the paper	Paper code	W.E.F.
I B.Sc. CBZ	I	BIOLOGY OF NON-CHORDATES	R20ZOO101	2021-22

Total No of Hours for teaching-Learning	Instructional hours for week		Duration of semester End examination in Hours	Max marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	3	3 Hours	40	60	3

Course Objectives :

- The course will cover Non-Chordates , which is the science that studies the animals without backbone.
- To describe common and distinctive features of invertebrate phyla, including poriferans, cnidarians, Platyhelminthes, nematodes, molluses, annelids, arthropods and echinoderms.
- To explain phylogenetic relationships between the phyla covered.
- To describe important concepts in invertebrate body structure and organization.
- To explain about Vermiculture as a part of solid waste management that also provides self-employment to students.

Course Outcomes:

- On completion of this course, students will have the knowledge and skills to:
- Describe the variety of invertebrate organisms and explain their evolutionary origin and diversification.
- Investigate invertebrates in laboratory and field conditions and identify major taxonomic groups.
- Understand and communicate the major evolutionary innovations in invertebrate groups.
- Describe the functional significance of associated morphologies and behaviors.

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ZOOLOGY SYLLABUS FOR I SEMESTER

PAPER – II: ANIMAL DIVERSITY – BIOLOGY OF NON-CHORDATES

Max

Class	Semester	Title of the paper	Paper code	W.E.F.
I B.Sc. CBZ	I	BIOLOGY OF NON-CHORDATES	R20ZOO101	2021-22

UNIT – I

1.1 Binomial nomenclature – Rules of nomenclature

1.2 Whittaker's five kingdom concept and classification of Animal Kingdom.

Phylum Protozoa

1.3 General Characters and classification of protozoa up to classes with suitable examples

1.4 Locomotion in Protozoans

1.5. Elphidium (type study)

UNIT –II

Phylum Porifera

2.1 General characters and classification up to classes with suitable examples

2.2 Canal system in sponges

Phylum Coelenterata

2.3 General characters with suitable examples

2.4 Metagenesisin Obelia

2.5 Polymorphism in coelenterates

2.6 Corals and coral reefs

Phylum Ctenophora :

2.7 Evolutionary significance(affinities)

Unit – III

Phylum Platyhelminthes

3.1 General characters with suitable examples

3.2 Life cycle and pathogenecity of Fasciola hepatica

3.3 Parasitic Adaptations in helminthes

Phylum Nemathelminthes

3.4 .General characters and classification up to classes with suitable examples

3.5. Life cycle and pathogenecity of Ascaris lumbricoides

Unit – IV

Phylum Annelida

4.1 . General characters and classification up to classes with suitable examples

4.2 . Evolution of Coelom and Coelomoducts

4.3 . Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

Phylum Arthropoda

4.4 .General characters with suitable examples

4.5 .Respiration in Arthropoda

4.6 .Metamorphosis in Insects

4.7. Peripatus - Structure and affinities

4.8 .Social Life in Bees and Termites

Unit – V

Phylum Mollusca

5.1. General characters and classification up to classes with suitable examples

5.2.Pearl formation in Pelecypoda

5.3.Torsion in Gastropoda

Phylum Echinodermata

5.4.General characters and classification up to classes with suitable examples

5.5 .Water vascular system in star fish

5.6. Larval forms of Echinodermata

Phylum Hemichordata

5.7 General characters with suitable examples

5.8 Balanoglossus – Structure and Affinities

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ZOOLOGY MODEL PAPER FOR I SEMESTER

ZOOLOGY - PAPER - I

ANIMAL DIVERSITY – BIOLOGY OF NON - CHORDATES

Time: 3 hrs **Max. Marks: 60**

I. Answer any FOUR of the following: 4 X 5 =20m

Draw labeled diagrams wherever necessary

1. Binomial Nomenclature
2. Types of Coral Reefs
3. Pathogenecity of Ascaris lumbricoides
4. Evolution of coelom
5. Social life in Bees
6. Structure of Balanoglossus

II. Answer any FIVE of the following: 5x8=40M

Draw labeled diagrams wherever necessary

9. A)Write an essay on various locomotary devices in phylum protozoa

OR

B) Describe the life cycle of Elphidium with neat labeled diagram.

10.A) Describe Various types of canal systems

OR

B) Write an essay on corals.

11.A) Give an account of life history of Fasciola hepatica.

OR

B) Describe the life cycle of Ascaris lumbricoides.

12.A)Write an essay on processing and economic importance of Vermicompost.

OR

B) Write an essay on Metamorphosis in insects.

13.A) Describe the process of Torsion in Gastropoda.

OR

B) Describe the Water Vascular System in Star fish

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Class	Semester	Title of the paper	Paper code	W.E.F.
I B.Sc. CBZ	**II**	**BIOLOGY OF CHORDATES**	R20ZOO201	**2021-22**

Total No of Hours for teaching-Learning	Instructional hours for week		Duration of semester End examination in Hours	Max marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	4	3	3 Hours	25	75	4+1

Course objectives:

- To indicate the major characteristics possessed by all chordates and those features that separates them.
- To describe the fundamental structure and function of the circulatory, respiratory, renal and digestive systems of vertebrates.
- To know the characteristics required to evolve a terrestrial form of life from an aquatic one.
- To understand how amphibians differ from the three other classes of terrestrial vertebrates with emphasis on their parental care.
- To make them understand the special adaptions found in the birds.
- To provide knowledge about the monotremes ,marsupials and placental mammals .

Course outcomes :

- Understand the evolution of chordates including their phylogeny and the modification of key innovtions and homologous structures among taxa
- Identify and describe the defining characteristics of the major vertebrate classes as well as hemi-and protochordates.
- Describe the major architectural features of the integumentary, skeletal, nervous, muscular, digestive, respiratory, circulatory, excretory and reproductive systems.
- Develop an understanding of the application of comparative anatomy in current scientific methods.

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ZOOLOGY SYLLABUS FOR II SEMESTER

PAPER – II: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

HOURS: 60(5X12) **Max. Marks: 100**

Class	Semester	Title of the paper	Paper code	W.E.F.
I B.Sc. CBZ	**II**	**BIOLOGY OF CHORDATES**	R20ZOO201	**2021-22**

Unit - I

1.1 General characters and classification of Chordata upto classes

1.2 Protochordata- Salient features of Cephalochordata , Affinities of Cephalochordata.

1.3 Salient features of Urochordata

1.4 Structure and life history of *Herdmania*

1.5 Retrogressive metamorphosis –Process and Significance

Unit - II

2.1 Cyclostomata, General characters, Comparison of*Petromyzon* and *Myxine*

2.2 Pisces : General characters of Fishes

2.3 *Scoliodon*: External features, Digestive system, Respiratory system, Structure andfunction of Heart, Structure and functions of the Brain.

2.4 Migration in Fishes

2.5 Types of Scales

2.6 Dipnoi

Unit - III

3.1 General characters of Amphibia

3.2 Classification of Amphibiaup to orders with examples.

3.4 *Ranahexadactyla*: External features, Digestive system, Respiratory system, Structureand function of Heart, structure and functions of the Brain

3.5 Reptilia: General characters of Reptilia, Classification of Reptilia upto orderswithexamples

3.6 *Calotes*:External features, Digestive system, Respiratory system, Structure andfunction of Heart, structure and function of Brain

3.7 Identification of Poisonous snakes and Skull in reptiles

Unit - IV

4.1 Aves General characters of Aves

4.2 *Columba livia*: External features, Digestive system, Respiratory system,

Structureand function of Heart, structure and function of Brain

4.3 Migration in Birds

4.4 Flight adaptation in birds

Unit - V

5.1 General characters of Mammalia

5.2 Classification of Mammalia upto sub - classes with examples

5.3 Comparision of Prototherians, Metatherians and Eutherians

5.4 Dentition in mammals

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Class	Semester	Title of the Paper	Paper code	W.E.F.
I B.Sc. CBZ	II	BIOLOGY OF CHORDATES	R20ZOO201	2022-2023

MODEL PAPER

SECTION - A

Answer the Five of the following questions **5 X 4 = 20 M**

1. Amphioxus
2. Placoid scales
3. Quill feather
4. Protheria
5. Anadromous migration
6. Draco
7. Emu
8. Apoda

SECTION - B

Answer ALL of the following questions **5 X 8 = 40 M**

9. A)Explain the life history of Herdimania ?

(**Or**)

B)Explain the origin and general characters of chordates?

10. A) Compare the characters of Petromyzon and Myxine ?

(**Or**)

B) Describe the structure of heart of scoliodon?

11. A)Describe the brain of Ranahexadactyla?

(**Or**)

B) Explain the external features of calotes?

12. A)Write an essay on flight adaptations of birds ?

(**Or**)

B)Explain the respiratory system of Colunbia livia?

13. A) Compare the characters of Metatheria and Eutheria ?

(**Or**)

B)Write an essay of dentition in mammala?

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Class	Semester	Title of the paper	Paper code	W.E.F.
II B.Sc. CBZ	**III**	**CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION**	R20ZOO301	**2021-22**

Total No of Hours for teaching-Learning	Instructional hours for week		Duration of semester End examination in Hours	Max marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	**4**	**3**	**3 Hours**	**25**	**75**	**4+1**

COURSE OBJECTIVES:

- To understand the origin of cell and distinguish between prokaryotic and eukaryotic cell and the role of different cell organelles in maintenance of life activities
- To provide the history and basic concepts of heredity, variations and gene interaction and to enable the students distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance.
- To acquaint student with basic concepts of molecular biology as to how characters are expressed with a coordinated functioning of replication, transcription and translation in all living beings
- To provide knowledge on origin of life, theories and forces of evolution
- To understand the role of variations and mutations in evolution of organism.

COUSRE OUTCOMES :

- To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure and to Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
- To understandthe history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals
- Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders
- Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.
- Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society.

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ZOOLOGY SYLLABUS FOR III SEMESTER

PAPER – II: CELL BIOLOGY, MOLECULAR BIOLOGY, GENETICS AND EVOLUTION

Max

Class	Semester	Title of the paper	Paper code	W.E.F.
II B.Sc. CBZ	**III**	**CELL BIOLOGY, MOLECULAR BIOLOGY, GENETICS AND EVOLUTION**	R20ZOO301	**2021-22**

UNIT 1 – CELL BIOLOGY

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma

1.2 Electron microscopic structure of animal cell.

1.3 Plasma membrane –Models and transport functions of plasma membrane.

1.4Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes

1.5 Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes

Unit – II Genetics - I

2. 1Mendel's work on transmission of traits

2. 2 Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes

2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance

2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)

2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

Unit – III Genetics - II

3.1 Mutations & Mutagenesis

3.2 Chromosomal Disorders (Autosomal and Allosomal)

3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)

3.4 Basics on Genomics and Proteomics

UNIT IV: Molecular Biology

4.1 Central Dogma of Molecular Biology

4.2 Basic concepts of -

a. DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)

b. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics)

c. Translation – Initiation, Elongation and Termination

4.3 Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes

Unit - V

5.1 Origin of life

5.2 Theories of Evolution: Lamarckism, Darwinism, Germ PlasmTheroy, Mutation Theory

5.3Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium

5.4Forces of Evolution: Isolating mechanisms, Genetic Drift, Natural Selection, Speciation

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ZOOLOGY MODEL PAPER FOR III SEMESTER

PAPER – II: CELL BIOLOGY, MOLECULAR BIOLOGY, GENETICS AND EVOLUTION

Time: 3 hrs **Max. Marks: 75**

I.Answer any FIVE of the following: **5x5=25M**

Draw labeled diagrams wherever necessary

1. Golgi complex
2. Co dominance
3. Y- linked inheritence
4. Mutations
5. Proteomics applications
6. Basics of post transcriptional modifications
7. Germ plasm theory
8. Genetic drift

ANSWER ANY FIVE OF THE FOLLOWING **5X10= 50M**
Draw labeled diagrams wherever necessary

9. Explain the fluid mosaic model of plasma membrane

OR

Write an essay on mitochondria

10. Explain chromosomal basis of sex detrmination

OR

Discuss X – linked recessive inheritance with suitable examples

11. Write an essay on autosomal disorders

OR

Discuss the basic concept of genomics and a note on its applications

12. Explain the semi conservative model of DNA replication

OR

Write an essay on LAC OPERON model of gene regulation

13. Explain the modern synthetic theory of evolution

Or

Write an essay on varied types of natural selection

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Class	Semester	Title of the paper	Paper code	W.E.F.
II B.Sc. CBZ	**IV**	**ANIMAL PHYSIOLOGY,CELLULAR METABOLISM AND EMBRYOLOGY**	R20ZOO401	**2021-22**

Total No of Hours for teaching-Learning	Instructional hours for week		Duration of semester End examination in Hours	Max marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	**4**	**3**	**3 Hours**	**25**	**75**	**4+1**

Course objectives :

- To achieve a thorough understanding of various aspects of physiological systems and their functioning in animals.
- To instil the concept of hormonal regulation of physiology, metabolism and reproduction in animals.
- To provide insightful knowledge on the structure and classification of carbohydrates, proteins, lipids and enzymes
- To demonstrate an understanding of fundamental biochemical principles such as the function of biomolecules, metabolic pathways and the regulation of biochemical processes
- To make students gain proficiency in laboratory techniques in biochemistry and orient them to apply the scientific method to the processes of experimentation and hypothesis testing.

Course outcomes :

- Understand the functions of important animal physiological systems including digestion, cardio-respiratory and renal systems.
- Understand the muscular system and the neuro-endocrine regulation of animal growth, development and metabolism with a special knowledge of hormonal control of human reproduction.
- Describe the structure, classification and chemistry of biomolecules and enzymes responsible for sustenance of life in living organisms
- Develop broadunderstanding the basic metabolic activities pertaining to the catabolism and anabolism of various biomolecules
- Describe the key events in early embryonic development starting from the formation of gametes upto gastrulation and formation of primary germ layers.

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ZOOLOGY SYLLABUS FOR IV SEMESTER

PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

HOURS: 60 (5X12) **Max. Marks: 100**

Class	Semester	Title of the paper	Paper code	W.E.F.
II B.Sc. CBZ	**IV**	**ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY**	R20ZOO401	**2021-22**

UNIT- I Animal Physiology - I

1.1 Process of digestion and assimilation

1.2 Respiration - Pulmonary ventilation, transport of oxygen and CO2

(Note: Need not study cellular respiration here)

1.3 Circulation - Structure and functioning of heart, Cardiac cycle

1.4 Excretion - Structure and functions of kidney urine formation, counter current Mechanism

UNIT- II Animal Physiology - II

2.1Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers

2.2Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction

2.3 Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas

2.4 Hormonal control of reproduction in a mammal

UNIT- III Cellular Metabolism – I (Biomolecules)

3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose

3.2 Proteins - Classification of proteins. General properties of amino acids

3.3 Lipids - Classification of lipids

3.4 Enzymes: Classification and Mechanism of Action

UNIT-IV Cellular Metabolism – II

4.1Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain, Glycogen metabolism, Gluconeogenesis

4.2 Lipid Metabolism – β-oxidation of palmitic acid

4.3 Protein metabolism - Transamination, Deamination and Urea Cycle

Unit – V Embryology

5.1 Gametogenesis

5.2 Fertilization

5.3 Types of eggs

5.4 Types of cleavages

5. 5 Development of Frog upto formation of primary germ layers

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ZOOLOGY MODEL PAPER FOR IV SEMESTER

ZOOLOGY - PAPER – IV - ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Time : 3 hrs **Max. Marks : 75**

I. Answer any FIVE of the following : **5x5=25**
Draw labeled diagrams wherever necessary

1.

2.

3.

4.

5.

6.

7.

8.

II. Answer any FIVE of the following: **5x10=50**
Draw labeled diagrams wherever necessary

9.

OR

10.

OR

11.

OR

12.

OR

13.

OR

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Class	Semester	Title of the paper	Paper code	W.E.F.
II B.Sc. CBZ	**IV**	**IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY**	R20ZOO402	**2021-22**

Total No of Hours for teaching-Learning	Instructional hours for week		Duration of semester End examination in Hours	Max marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	**4**	**3**	**3 Hours**	**25**	**75**	**4+1**

COURSE OBJECTIVES :

- To get knowledge of the organs of Immune system, types of immunity, cells and organs of immunity
- To describe immunological response as to how it is triggered (antigens) and regulated (antibodies)
- Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.
- Get familiar with the tools and techniques of animal biotechnology..
- To introduce students to the , commercial and ethical aspects of the biotechnology industry .

COURSE OUTCOMES :

- To provide students with a foundation in immunological processes
- To be able to compare and contrast the innate versus adaptive immune systems and humoral versus cell-mediated immune responses
- Understand the significance of the Major Histocompatibility Complex in terms of immune response and transplantation
- To provide knowledge on animal cell and tissue culture and their preservation
- To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hyridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms

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ZOOLOGY SYLLABUS FOR SEMESTER - IV

PAPER – 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

HOURS : 60 (5X12) Max. Marks: 100

Unit – I Immunology – I (Overview of Immune system)

1.1 Introduction to basic concepts in Immunology

1.2 Innate and adaptive immunity, Vaccines and Immunization programme

1.3 Cells of immune system

1.4 Organs of immune system

Unit – II Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)

2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity

2.2 Antibodies: Structure of antibody, Classes and functions of antibodies

2.3 Structure and functions of major histocompatibility complexes

2.4 Exogenous and Endogenous pathways of antigen presentation and processing

2.5 Hypersensitivity – Classification and Types

Unit – III Techniques

3.1 Animal Cell, Tissue and Organ culture media: Natural and Synthetic media,

3.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organ culture; Cryopreservation of cultures

3.3 Stem cells: Types of stem cells and applications

3.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

Unit – IV Applications of Animal Biotechnology

4.1 Genetic Engineering:Basic concept, Vectors, Restriction Endonucleases and Recombinant DNA technology

4.2 Gene delivery:Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated gene delivery

4.3 Transgenic Animals:Strategies of Gene transfer; Transgenic - sheep, - fish; a pplications

4.4 Manipulation of reproduction in animals:Artificial Insemination, In vitro fertilization, super ovulation, Embryo transfer, Embryo cloning

Unit - V

5.1. PCR:Basics of PCR.

5.2 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing (2 hrs)

5.3 Hybridization techniques: Southern, Northern and Western blotting

5.4 DNA fingerprinting: Procedure and applications

5.5 Applications in Industry and Agriculture: Fermentation: Different types of Fermentation and Downstream processing; Agriculture: Monoculture in fishes, polyploidy in fishes

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ZOOLOGY MODEL PAPER FOR V SEMESTER
COURSE – 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Time: 3 hrs **Max. Marks: 75**

I**. Answer any FIVE of the following:** **5x5=25**
Draw labeled diagrams wherever necessary

1.

2.

3.

4.

5.

6.

7.

8.

II**. Answer any FIVE of the following:** **5x10=50**
Draw labeled diagrams wherever necessary

9.

OR

10.

OR

11.

OR

12.

OR

13.

OR

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Class	Semester	Title of the paper	Paper code	W.E.F.
III B.Sc. CBZ	**VI**	**Sustainable Aquaculture Management**	R20ZOO501	**2021-22**

Total No of Hours for teaching-Learning	Instructional hours for week		Duration of semester End examination in Hours	Max marks		Credits
60 Hours	**Theory**	**Practical**	**3 Hours**	**CIA**	**SEE**	**4+1**

Course objectives:

- There is a for qualified and professional people to work in the aquaculture industry. Hence the course is designed to provide knowledge and skills in aquaculture systems, how they work, and how to best manage them.
- This course examines the production, management, and markets for captured and farmed fish
- To describe the water quality management as the fishes also have a good taste and do not suffer from diseases.
- To explain the feed management as the growth of fish in the ponds is directly related to the amount of food available in the pond.
- To provide information and give practical knowledge on the disease management of fishes by visiting the fish and prawn farms.

Course Outcomes:

- After completing this course, students will:
- Understand why there is a need for fisheries management and regulation.
- Be able to understand the various problems to be faced in maintaining water quality.
- Be able to analyse and discuss how different types of regulations affect economic behaviour.
- Be familiar with the feed formulation and feed storage.
- Know the relevant markets for fish and aquaculture products, know how these markets work and how they affect production.

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Kothapet, Vijayawada-1, Andhra Pradesh.
(An Autonomous Institution with affiliation to Krishna University, Machilipatnam)

Class	Semester	Title of The Paper	Paper Code	W.E.F
III B.Sc. CBZ	V	Sustainable Aquaculture Management	R20ZOO501	2017-18

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	3	3	3 Hours	25	75	4+2

Unit: 1

1.1 Present status of Aquaculture – Global and National scenario

1.2 Major cultivable species for aquaculture: freshwater, brackish water and marine.

1.3 Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp.

1.4 Design and construction of fish and shrimp farms

Unit: 2

2.1 Functional classification of ponds – head pond, hatchery, nursery ponds

2.2 Functional classification of ponds -rearing, production, stocking and quarantine ponds

2.3 Need of fertilizer and manure application in culture ponds

2.4 Physio-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity, light, water, PH, BOD, CO_2 and nutrients)

Unit: 3

3.1. Induced breeding in fishes

3.2. Culture of Indian major carps: Pre-stocking management (Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization)

3.3. Culture of Indian major carps - Stocking management

3.4. Culture of Indian major carps - post-stocking management

Unit: 4

4.1 Commercial importance of shrimp & prawn

4.2 *Macrobrachium rosenbergii*- biology, seed production.

4.3 Culture of *L. vannamei* – hatchery technology and culture practices

4.4 Mixed culture of fish and prawns

Unit: 5

5.1 Viral diseases of Fin Fish & shell fish

5.2 Fungal diseases of Fin & Shell fish

5.3 Bacterial diseases of Finfish & Shell fish

5.4 Prophylaxis in aquaculture

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ZOOLOGY MODEL QUESTION PAPER
SUSTAINABLE AQUACULTURE MANAGEMENT
PAPER CODE : R20ZOO501

Max.Marks:75 Time:3 hrs

SECTION - A(Total: 10 Marks)

Very Short Answer Questions (10 Marks: 5x2)

1. …….
2. …….
3. ……
4. ……
5. ……..

SECTION – B (Total: 5x5=25Marks)

(Answer any Five questions. Each answer carries 5 marks)
(At least1 question should be given from each Unit)

6. ……
7. ……
8. ……
9. …….
10. ……..
11. ……..
12. ……
13. ……

SECTION C (Total: 4x10 = 40 Marks)

(Answer any four questions. Each answer carries10 marks)

(Atleast1questionshould be given from each Unit)

14. ..…….
15. ……
16. …….
17. ……
18. …….
19. ……..

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Class	Semester	Title of the paper	Paper code	W.E.F.
III B.Sc. CBZ	**V**	**Post- harvest Technology of fish and fisheries**	R20ZOO502	**2021-22**

Total No of Hours for teaching-Learning	Instructional hours for week		Duration of semester End examination in Hours	Max marks		Credits
60 Hours	**Theory**	**Practical**	**3 Hours**	**CIA**	**SEE**	**4+1**

Course objectives:

- To learn about various scientific methods of harvesting, handling and transportation of fish.
- To know the reasons for spoilage of fish and describe the methods that can be used for its prevention
- To learn about the traditional and advanced methods of fish preservation.
- To discuss various methods of recovering waste as by products which are important from both economic and nutritional point of view and avoid the problems of waste disposal.
- To discuss the attributes of quality and the various methods of measuring them.

Course Outcomes:

- After studying this course the student would be able to
- Learn the importance of proper handling methods and timing of fish crops to obtain maximum benefit from aquaculture.
- Use methods to prevent spoilage of fish and its products by preservation and processing.
- Realise that no part of fish is waste and most of it can be recovered as useful by product
- Know that an integrated approach by the aqua culturist, harvester and processor of aquaproducts is essential to obtain superior quality products.

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Class	Semester	Title of The Paper	Paper Code	W.E.F
III B.Sc. CBZ	V	Post-harvest Technology	CB ZOOB 604	2017-18

Total No of Hours for Teaching - Learning	Instructional Hours for Week		Duration of Semester End Examination in Hours	Max Marks		Credits
	Theory	Practical		CIA	SEE	
60 Hours	3	3	3 Hours	25	75	4+2

Unit–I

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 andspoilage), spoilage in marine fish and freshwater fish.

1.1.2 : Principles of preservation–cleaning, lowering of temperature, rising of temperature, denudation, useof salt, use of fish preservatives, exposure to low radiation of gamma rays.

Unit–II

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

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 cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.

3.1.2 : Fish by-products– fish glue, isinglass, chitosan, pearl essence, shark fins, fish leather and fish maws.

Unit IV

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, control during processing and control after processing.

4.2: Regulatory affairs in industries

Unit–V

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 sea food safety.

5.1.2 : National and International standards– ISO9000:2000 Series of Quality Assurance System,Codex Alimentarius.

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ZOOLOGY MODEL QUESTION PAPER
POST HARVEST TECHNOLOGY OF FISH AND FISHERIES
PAPER CODE : R20ZOO502

Max.Marks:75 Time:3 hrs

SECTION - A(Total: 10 Marks)

Very Short Answer Questions (10 Marks: 5x2)

1. …….
2. …….
3. ……
4. ……
5. ……..

SECTION – B (Total: 5x5=25Marks)

(Answer any Five questions. Each answer carries 5 marks)
(At least1 question should be given from each Unit)

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SECTION C (Total: 4x10 = 40 Marks)

(Answer any four questions. Each answer carries10 marks)

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