

# DEPARTMENT OF ZOOLOGY

## COURSE CURRICULUM & MARKING SCHEME

### M.Sc. ZOOLOGY

### Semester - IV

SESSION : 2024-25



ESTD: 1958

## GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A<sup>+</sup>, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - [www.govtsciencecollegedurg.ac.in](http://www.govtsciencecollegedurg.ac.in), Email – [autonomousdurg2013@gmail.com](mailto:autonomousdurg2013@gmail.com)

**Department of Zoology**  
**Govt. V.Y.T. PG Autonomous College, Durg (C.G.)**  
**Session 2023-25**

**Learning Outcome Based curriculum for M. Sc. Zoology**

**Program Specific Outcome (PSO): M. Sc. Zoology**

The programme enables the students:

- To comprehend knowledge of biology in a diversity of organisms encompassing different ecosystem levels
- To develop practical skills and ability to perform experiments and analysis through appropriate application of statistical tools and technologies to obtain accurate results and thus gain the ability to solve problems.
- To develop cognitive and hands-on skills in advanced scientific methods and their uses in applied and advanced zoological sciences
- To connect, comprehend and apply the value of the diversity and complexity of animal life as revealed through studies on morphology, physiology, cellular and molecular biology and biochemistry.
- Acquire knowledge and critical analytical skills on different scientific arenas such as immunology, endocrinology, microbiology and genetics
- Be proficient at critical thinking, annotation and communication of scientific information and able to succeed in competitive examinations and interviews.

**Name and Signatures**

Chairperson/H.O.D	Departmental members
..... <i>[Signature]</i>	1.....
University Nominee .....	2..... <i>[Signature]</i>
Subject Expert .....	3..... <i>[Signature]</i>
Subject Expert .....	4..... <i>[Signature]</i>
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Student representative .....	7..... <i>[Signature]</i>
Other Prof. from Science faculty ..... <i>[Signature]</i>	8.....

Syllabus for M. Sc. Zoology by the Members of Board of Studies for session 2023 -24 and 2024-25

**Semester I**

(MZO 101) Paper I: Biosystematics and Taxonomy	(MZO 102) Paper II: Structure and Functions in Invertebrates
(MZO 103) Paper III: Endocrinology	(MZO 104) Paper IV: Cell and Molecular Biology
MZOL 01, Lab Course I: Based on Paper I and II	MZOL 02, Lab Course II: Based on Paper II I and IV

**Semester II**

(MZO 201) Paper I: Population Genetics and Evolution	(MZO 202) Paper II: Reproductive Biology
(MZO 203) Paper III: Tools and Techniques in Biology	(MZO 204) Paper IV: Environmental Physiology
MZOL 03, Lab Course I: based on paper I and II	MZOL 04, Lab Course II: Based on paper III and IV

**Semester III:**

(MZO 301) Paper I: Comparative Anatomy of Vertebrates	(MZO 302) Paper II: Biostatistics
(MZO 303) Paper III: Ichthyology	(MZO 304) Paper III B: Animal Behaviour
MZOL 05, Lab Course I: Based on Paper I and II	MZOL 06, Lab Course II: Based on Paper III and IV

**Semester IV:**

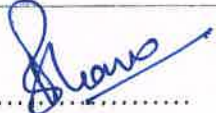





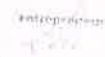

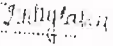




(MZO 401) Paper I: Insect Biology	(MZO 402) Paper II: Animal Physiology
(MZO 403) Paper III : Population Ecology	(MZO 404A) Paper IV A: Fisheries and Aquaculture (Elective)
(MZO 404B) Paper IV B: Parasitology (Elective)	(MZO 404C) Paper IV C: Economic Zoology (Elective)
(MZO 404D) Paper IV C: Sericulture (Elective)	
MZOL 07, Lab Course I: Based on Paper I, II and III	MZOL 08, Lab Course II: Project Work
Any one elective course to be selected as paper IV	

**Project Work:** A project work to be done by each student based on theoretical and experimental works under allotted supervisor from the department. The project work shall be initiated at the beginning of semester IV.

**Evaluation of Project work:** The project report shall be submitted to the department with duly signed by the supervisor and the Head of the institution within stipulated time. Evaluation of the projects shall be done by external examiner through power point presentation by the students.

The Syllabus for M. Sc. Zoology is hereby approved for the sessions 2023 -24 and 2024-25

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University Nominee		1.....
Subject Expert		2..... 
Subject Expert		3..... 4..... 
Representative from Industry/entrepreneur		5..... 
Student representative		6..... 
Other Prof. from Science faculty		7..... 
		8..... 

## GENERAL INSTRUCTIONS FOR STUDENTS

1. The candidate has to obtain minimum 20% marks in each theory paper and internal assessment separately.
2. The candidate has to secure minimum 36% marks as an aggregate in order to pass that semester examination.
3. The internal assessment shall include class test, home assignment and seminar presentation.
4. In internal assessment, the marks taken into consideration will be the average of two tests (i.e. the class test and the home assignment) for each paper and shall of 20 marks.
  - a. The seminar shall be in lieu of class test and home assignment combined and shall be of 20 marks.
  - b. There shall be one seminar in each semester.
  - c. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

## DIRECTIVES FOR STUDENTS, FACULTY AND EXAMINERS

1. There shall be three sections (Section A, B, and C) in each theory paper.
2. Section A shall contain very short answer type questions (One or two line answer) or objective type questions (fill in the blank, not multiple choice questions).
3. Section B shall contain short answer type questions with the limit of 250 words.
4. Section C shall contain long answer/ descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 450 words.
5. The students are required to study the content mentioned in the curriculum exhaustively.

## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice. Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

**Internal Assessment 20 marks = 01 credit**

- **Unit test** – One class test in each theory paper comprising 20 marks. (containing two short answer type questions of 05 marks each and 05 objective type questions of 10 marks).
- **Home assignments** – Two long answer type questions from each theory paper containing 10 marks each. The answer should be prepared with the help of standard reference books. (The titles of those books, authors, year of publication and publishers details should be mentioned in an appropriate way, at the end of each assignment).
- **Seminar presentations (Power point)** – Comprising 20 marks.  
Each student has to be prepare one seminar in each semester. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

➤ **Practical 200 marks = 08 credits**

Two practicals of 100 marks each

#### **CREDIT ALLOTMENTS**

- **Theory Paper = 05 credits (04+01)**
- **Practical = 04/ 08 credits**

#### **TOTAL CREDITS/ SEMESTER**

- **Science Subjects with 04 theory papers (100 each) and one /two practical ( 100 each) - 20 + 08 =28 credits**
- **Science Subjects with 05 theory papers (no practical-Maths) – 25 credits**
- **Arts Subjects with 04 theory papers – 20 credits**
- **Arts Subjects with 05 theory papers – 25 credits**
- **Commerce subject with 05 theory papers – 25 credits**

**TOTAL CREDITS / PROGRAMME**

- 16 Theory + 08 Practical + Project work – 80 + 32 + 08 = 120 credits
- 20 Theory – 100 credits (Maths)
- 20 Theory – 100 credits (Arts and Commerce)
- 16 Theory – 80 credits (Arts)

**Name and Signatures**

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..... <i>[Signature]</i>	1.....
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**DEPARTMENT OF ZOOLOGY**  
**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG**  
**Approved syllabus for M. Sc. ZOOLOGY**  
**by the members of Board of Studies for the**  
**Session 2024-25**

**Syllabus and Marking Scheme for Semester IV (2024-25)**

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Credits
		Max	Min	Max.	Min.	
I	MZO 401/INSECT BIOLOGY	80	16	20	04	05
II	MZO 402/ANIMAL PHYSIOLOGY	80	16	20	04	05
III	MZO 403/POPULATION ECOLOGY	80	16	20	04	05
IV	MZO 404/ELECTIVE COURSE A. FISHERIES AND AQUACULTURE B. PARASITOLOGY C. ECONOMIC ZOOLOGY D. SERICULTURE (Any one course opted by student)	80	16	20	04	05
V	MZOL 07, Lab Course I INSECT BIOLOGY ANIMAL PHYSIOLOGY FISHERIES AND AQUACULTURE OR PARASITOLOGY OR ECONOMIC ZOOLOGY OR SERICULTURE	100	33			04
IV	MZOL 08, Lab Course II PROJECT WORK	100	33			04
	<b>Total</b>	<b>520</b>		<b>80</b>		<b>28</b>

04 Theory papers	-	320
04 Internal Assessment	-	80
01 Practical	-	100
01 Project	-	100
Total Marks	-	600
Credits	-	28



**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG**

**M. Sc. ZOOLOGY**

**Semester - IV**

**SESSION 2024-2025**

**PAPER- I**

**Course Code - MZO401**

**INSECT BIOLOGY**

Max.M.- 80

Min. M.-16

**UNIT-I**

**General characters and Classification of insects (up to order)**

- Segmentation in insects
- Mouth parts in insects
- Social organization in insects (Ants and Termites)
- Economic importance of insects

**Digestive System**

- Alimentary canal and associated glands
- Physiology of digestion
- Metabolism

**UNIT-II**

**Respiratory System**

- Respiration in terrestrial insects
- Respiration in aquatic insects
- Endo-parasitic respiration in insects

**Circulatory System**

- Haemocyte and Haemolymph
- Connective tissue.
- Plasma.

**Nervous System**

- Structure of Nervous System.
- Physiology of Nervous System.

**UNIT-III**

**Excretory System**

- Excretory organs in insects.
- Nitrogenous excretion.
- Salt & water regulation.

**Physiology of Sonification**

- Mechanism of sound production.
- Significance of sound production.
- Control of sound production.

### Physiology of vision

- Structure of compound eye.
- Functioning of the eye.

### Muscular System

- Structure of muscles in insects.
- Physiology of insect muscle.

## UNIT-IV

### Reproductive system

- Male and female reproductive organs.
- Development, Growth and Metamorphosis in grasshopper and Butterfly.
- Pheromones

### Pest management

- Pest of rice, sugarcane and pulses
- Classification of insecticides
- Chemical control of insect pest
- Biological control of insect pest

## SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. Basic & applied Entomology – Nayar.
2. Comparative Entomology – R. F. Chaipman.
3. Entomology – Barrington.
4. Entomology – Lefroy.

## Course Outcomes

After successful completion of these courses the student would be able:

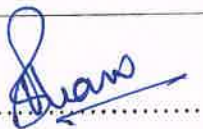








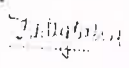



- To receive an understanding of general characters, structure and physiology of insects.
- To explain the physiology of different system of insects.
- To gain knowledge about beneficial and non-beneficial insects.
- To learn the skills of identification, seasonal history, biology, nature of damage and control measures of pests, of cereals, pulse crops, cotton, vegetables, oil seeds, fruit crops, sugarcane and stored grains
- To understand the methods to effectively eliminate harmful insects by mode of action of chemical or biological insecticide.

## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
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Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper I (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for the Session 2024 -25  
Name and Signatures

Chairperson/H.O.D 	Departmental members
University Nominee	1.....
Subject Expert 	2..... 
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**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG**

**M. Sc. ZOOLOGY**

**Semester - IV**

**SESSION 2024-2025**

**PAPER- II**

**Course Code – MZO402**

**Animal physiology**

Max.M- 80

Min. M.-16

**UNIT-I**

**Circulation**

- Composition of blood, Structure & functions of its constituents
- Blood groups, Blood coagulation, Anti coagulants
- Blood transfusion
- Hemoglobin & its polymorphism, Anemia
- Physiological Anatomy of Heart
- Divisions of Circulation: Systemic and pulmonary circulation
- Capillary fluid exchange
- Neural and hormonal control of heart
- Auto regulation mechanism in heart
- Cardiac output and vascular reflexes
- Lymphatic circulation

**UNIT-II**

**Respiration**

- Mechanism of Gas exchange and transport
- Hypoxia, Physiology of hypo-barrism in high altitude
- Neural and Chemical control of respiration
- Work & exercise physiology
- Respiration in Birds

**Immunology**

- Definition and types of immunity
- Innate and acquired immunity
- Lymphoid organ and Immune cells
- Immunoglobulines, Complements and Major Histocompatibility Complex (MHC)
- Autoimmunity and Immunodeficiency diseases
- Immune response against bacterial(TB), Parasitic(Malaria) and Viral(HIV) infections.
- Immuno-prophylaxis

### UNIT-III

#### Excretion

- Structure and function of Kidney and Nephron
- Mechanism of urine formation: Glomerular filtration: GFR and factors affecting GFR, Tubular reabsorption and Secretion
- Renal Circulation
- Regulation of acid base balance by kidney
- Renal regulation of body fluids: Role of ADH and RAAS (Renin-Angiotensin-Aldosterone System)
- Mechanism of Micturition, Cystometrogram
- Renal failure: Uremia
- Renal function in Birds
- Bioluminescence: Chemical basis and Biological significance

### UNIT-IV

#### MUSCLE PHYSIOLOGY

- Muscle types
- Neuro- muscular junction
- Mechanism of muscle contraction
- Muscular fatigue

#### NERVE PHYSIOLOGY

- Neurons
- Action potential
- Conduction of nerve impulses
- Neural control of muscle tone and posture

#### SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. Comparative Animal Physiology: Prosser and Brown, Saunders.
2. Human Physiology: C.C. Chatterjee, Medical Allied Agency, Calcutta.
3. Text book of Medical Physiology: Guyton and Hall, Saunders.
4. Essentials of Medical Physiology: K. Sembulingam & P. Sembulingam.
5. Immunology: An Introduction: Ian R. Tizard, 4<sup>th</sup> Edition, Saunders College Publishing.

## Course Outcomes

After successful completion of these courses the student would be able:

- To gain an integrated understanding of physiological mechanisms
- To learn the physiology of digestive and respiratory system of human beings.
- To understand the blood composition, types, groups and circulatory system.
- To describe the physiology of excretory system and nervous system of human beings
- To know the physiology of sense organs, muscles and reproductive system.

## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper II (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for the Session 2024 -25

Name and Signatures

Chairperson/H.O.D	Departmental members
..... <i>[Signature]</i>	1.....
University Nominee ..... <i>[Signature]</i>	2..... <i>[Signature]</i>
Subject Expert ..... <i>[Signature]</i>	3.....
Subject Expert ..... <i>[Signature]</i>	4..... <i>[Signature]</i>
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**M. Sc. ZOOLOGY**  
**Semester - IV**  
**SESSION 2024-2025**  
**Paper – III**  
**Course Code - MZO403**  
**POPULATION ECOLOGY**

Max.M.- 80

Min.M.-16

**UNIT-I**

**Demography**

- Life tables – definition, construction & uses.
- Survivorship curves – Types & uses.

**Population density –**

- Definition & different methods for determining population density.
- Fecundity
- Natality (Birth rate)
- Mortality (Death

**rate)Population Growth**

- Growth forms of population (exponential growth)
- Growth rate of population

**UNIT-II**

**Population dispersal - Migration**

- Emigration
- Immigration

**Regulation of population size**

- Extrinsic & Intrinsic mechanism
- Population cycle

**Age distribution of population**

- Age pyramids – different types & uses
- Age ratio
- Biotic potential and environmental resistance
- Methods of measuring the age of population

**UNIT -III**

**Reproductive strategies**

- R & K selection
- Breeding age and Sex ratio

**Concept of Niche**

- Habitat & niche
- Niche segregation

Competition - Intra specific & inter specific competition

Concept of Limiting Factors

- Liebig's law of minimum
- Shelford's law of tolerance
- Limiting factors & population control

#### UNIT -IV

Positive Interaction

- Neutralism – definition & different examples
- Commensalisms - definition & different examples
- Proto Co-operation - definition & different examples
- Mutualism - definition & different examples

Negative Interaction

- Predation – Definition & different examples
- Role of Predations in nature
- Components of Predation

Parasitism

- Host parasite relationship
- Parasitic adaptations
- Antibiosis

#### SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. Ecology with special reference to animal & man: S. Charles, Kendeigh, Prentice hall of India Pvt. Ltd. New Delhi.
2. Elements Of Tropical Ecology: Yanney Ewusie, English language Book Society, Heinemann educational book publication.
3. Fundamentals of Ecology: Odum P.

Course Outcomes

After successful completion of these courses the student would be able:

- To understand the characteristics of population and population dynamics.
- To explain the concept of illustration, coexistence and interactions among different species
- To make aware and responsible for surrounding nature.










## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper III (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for the Session 2024 -25  
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**M. Sc. ZOOLOGY**  
**Semester - IV**  
**SESSION 2024-2025**  
**Paper – IV (Elective)**  
**Course Code – MZO404A**  
**FISHERIES AND AQUACULTURE**

Max. M.- 80

Min. M.-16

**UNIT-1**

General character and identification of Indian Major Carps (*Catla, Labeo, Mrigala, Channa, Tilapia, Gobius and Punctus*)

Physico-Chemical and Biological factors in fish culture

Fresh water fish culture

- Construction and maintenance of fish farm.
- Management of ponds
- Aquatic weeds and their control

Fresh water fish breeding

- Dry and Wet bundh breeding
- Induced breeding
- Hatchery: types and their utilization

**UNIT – II**

Inland Fisheries

- Riverine fisheries
- Lakesterine Fisheries
- Coldwater Fisheries
- Estuarine Fisheries
- Marine Fisheries

Fish seed for stocking and transport

Fishing methods, Fish gears, crafts and nets

**UNIT –III**

- Composite Fish Culture and Integrated fish farming
- Fish cum paddy culture
- Fish cum poultry culture
- Sewage fed fisheries

**UNIT-IV**

- Aquarium maintenance for fresh water fishes
- Fish diseases and their control
- Fish preservation and processing
- Economic value of fishes
- Prawn and Pearl culture

## SUGGESTED READING MATERIALS (ALL LATEST EDITION)

1. An introduction to Fishes by S.S. Khanna, Silver Line Publication, Allahabad.
2. Environmental stress and fish disease by Wedmeyer, Meyer Smith, Narendra Publishing House, NewDelhi.
3. Fishery and Inland Fisheries by C.B.L. Shrivastava, Kitab Mahal.
4. General and applied Ichthyology( Fish and Fisheries) by S.K. Gupta, P.C. Gupta, S.Chand & Co, RamNagar, New Delhi.
5. Fish and Fisheries By Pandey and Shukla, Rastogi Publication , Meerut.
6. A Text book of Fish Biology and Indian Fisheries By Rahul P. Parihar, Central Publishing House,Allahabad,
7. Fish and Fisheries By Jhingran, Hindustan Publishing Cooperation, Delhi.

### Course Outcomes

After successful completion of these courses the student would be able:

- To understand about the economically important fishes and physico-chemical and biological parameters for successful fish culture
- To understand the scope of Inland fisheries and use of nets and gears in fish capture
- To understand the Composite Fish Culture and Integrated fish farming technology and also the utilityof different farming systems for sustainable fish culture
- To gain knowledge of ornamental or aquarium fish breeding
- To explain the preservation techniques for fishes and disease control measures
- To understand the scope of aquaculture



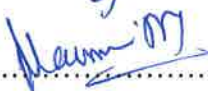





## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
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Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 12 Marks

The syllabus for Paper IV (Elective MZO404 A) (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for the Session 2024-25

Name and Signatures

Chairperson/H.O.D	Departmental members
	1.....
University Nominee	2..... 
Subject Expert	3..... 
Subject Expert	4..... 
Representative from Industry/entrepreneur	5..... 
Student representative	6..... 
Other Prof. from Science faculty	7..... 
	8..... 

**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG**

**M. Sc. ZOOLOGY**

**Semester - IV**

**SESSION 2024-2025**

**Paper – IV (Elective)**

**Course Code – MZO404B**

**PARASITOLOGY**

Max.M.- 80

Min. M.-16

**UNIT-1**

Types of parasites, types of hosts, inter relationship between host and parasite, Responses of hosts to parasitic infection, mode of transmission of parasite, host specificity and parasitic adaptation

**UNIT II**

Vibrio cholera: life cycle, mode of transmission, infection and treatment  
Yersinia pestis: life cycle, mode of transmission, infection and treatment

Influenza and H1N1 viruses: life cycle, mode of transmission, infection and treatment

Dengue - life cycle, mode of transmission, infection and treatment

**UNIT III**

Vectors: definition and types of vector, Arthropod vector of medical and veterinary importance, sandflies, mosquitoes, horse flies and Rat flea, ticks, mites and vector control

**UNIT – IV**

Study of parasites from Protozoa & Nematoda

1. Trypanosoma of humans
  2. Intestinal flagellates Giardia
  3. General life cycle of cestodes :Taenia
  4. General Life Cycle of Schistosoma and fasciola
  5. General Life Cycle of Wuchereria and Ancylostoma
- Plant nematodes: Cyst nematode

## REFERENCE BOOKS:

1. Ramnik Sood, 1993. Parasitology, C.B.S. Publisher, New Delhi.
2. K.D. Chatterjee, 1987. Parasitology, Medical Publisher Calcutta.
3. Hobler, E.R., and Noble, G.A., 1982. Parasitology 2nd Edition, Lea & Febieger U.S.A
4. Smit. D.G., 1997. Introduction Animal Parasitology 2nd Edition, Johnus Willey SonsNew York.
5. Soulsby, E.J.L., 1969. Helminths, Arthropods & Protozoa of Domesticated Animals, ELBS Publication London Ed.

## Course Outcomes

After successful completion of these courses the student would be able:

- To understand about the mode of transmission of parasites and their interrelationship with host
- To know about the viral diseases and their treatments
- To understand the medical and veterinary important insect vectors and their control
- To gain knowledge about diseases caused by protozoans and helminthes



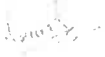

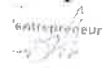
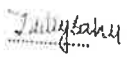

## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
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The syllabus for Paper IV (Elective MZO404 B) (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for the Session 2024 -25

Name and Signatures

Chairperson/H.O.D		Departmental members
University Nominee		1.....
Subject Expert		2..... 3..... 4.....
Subject Expert		5.....
Representative from Industry/entrepreneur		6..... 7.....
Student representative		8.....
Other Prof. from Science faculty		

**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG**

**M. Sc. ZOOLOGY**

**Semester - IV**

**SESSION 2024-2025**

**Paper – IV (Elective)**

**Course Code – MZO404C**

**ECONOMIC ZOOLOGY**

Max. M.- 80

Min. M.-16

**UNIT-1 Vermiculture**

Introduction, Types of earthworm, Biology of *Eisenia foetida*, Rearing of earthworms, Equipments, devices used in vermiculture, Vermicompost Technology, Methods and products, Vermiwash Collection, Composition & use

**UNIT II Apiculture and Prawn Culture**

Morphology and Biology of honey bees, Honey bee species, social behavior of honey bees, Bee keeping and ancillary industries, Newton's Bee hive Extraction of honey, Medicinal value of honey, bee products, Importance of bee colonies in crop pollination

**Prawn Culture:** Types of prawn fishery, Culture of fresh water prawn, Culture of marine prawn. Preparation of farm. Preservation, processing and export of prawn

**UNIT III Fish culture**

Aim of fish culture, Breeding Pond, Fish Seed, Hatching pond, Transport of fish fry to rearing ponds, Harvesting, Preservation of fish, Composite fish forming, By-products of fishing industry

**UNIT IV Poultry Management**

Breeds of fowl, Housing and Equipment, Deep litter System, Laying cages, Methods of brooding and Rearing, Debeaking. Management of growers, Layers, Broilers, Feed formulations for chicks, Growers and Broilers, Diseases of fowl, Nutritive value of egg and meet, Incubation and hatching of eggs



## REFERENCE BOOKS

1. Vasantharaj David, B. and Kumaraswami T., 1998. Elements of Economic Entomology Pop. Book Depot. Chennai.
2. Bhatnagar, R.K. and Palpa, R.K. 1996 Vermiculture and Vermicomposting, Kalyani Publishers, New Delhi.
3. Arul K. Sharma, A Hand book of Organic farming, Agro, Bio, Jothpur, India.
4. Shukla, G.S. and Xupadhyay G.S. Economic Zoology, Rastogi Publications, Meerut.
5. Arumugam, N. 2008. Aquaculture, Saras Publication Nagarkoli, Tamilnadu.
6. Shanmugam, K. 1992. Fishery Biology and Aquaculture LEO Pathipagam, Chennai.

## Course Outcomes

After successful completion of these courses the student would be able:

- To cultivate skills to understand vermiculture
- To learn the techniques of apiculture and prawn culture
- To develop technical skills on culture, rearing, harvesting and marketing management
- To gain knowledge about poultry management









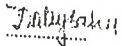




## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
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The syllabus for Paper IV (Elective MZO404 C) (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for the Session 2024 - 25

Name and Signatures

Chairperson/H.O.D		Departmental members
University Nominee		1.....
Subject Expert		2..... 
Subject Expert		3..... 4..... 
Representative from Industry/entrepreneur		5..... 
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		8..... 

**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE DURG**  
**M. Sc. ZOOLOGY**  
**Semester - IV**  
**SESSION 2024-2025**  
**Paper – IV (Elective)**  
**Course Code – 404D**  
**SERICULTURE**

Max.M.- 80  
Min. M.-16

**UNIT-1: General Aspects of Silkworms**

Types of Silkworms: Mulberry, tasar, muga, and eri

Morphology and life cycle of silkworms, Races of mulberry silkworms, Voltinism

**UNIT II Mulberry Cultivation**

Selection of land and cultivation of mulberry, Different methods of planting, Organic and Inorganic manure application, Pruning, Harvest and preservation of leaves, Pest and disease of mulberry and their control measures

**UNIT III Silkworm Rearing**

Disinfection of rearing houses and appliances, Egg handling, Hatching, Brushing, Silkworm rearing techniques, Shoot harvest method of rearing, Spacing and leaf requirement in different stages, Pest and disease of silkworm and preventive measures, Spinning and mounting, Harvesting of cocoon and cocoon assessment, Transportation and marketing

**UNIT IV Grainage Techniques**

Egg production, Acid treatment of hibernating eggs, Loose egg production, Grainage techniques, Materials required for a grainage  
Reeling methods, Re-reeling, Silk examination, cleaning, lacing, skeining, book making, Grainage of Silk.

## REFERENCE BOOKS

1. Rangasamy, G. 1987. Manual on Sericulture FAO, Vol. I to IV, Agriculture service bulletin, CSB, Bangalore, India.
2. Dandin, S.B. 2004. Hand book of New Sericulture technologies, Central Silk Board, Bangalore.
3. Ganga G. and J. Sulochana Chetiy, 2005. An Introduction to Sericulture 2nd Edition, Oxford and IBH Publishers & Co. New Delhi.

## Course Outcomes

After successful completion of these courses the student would be able:

- To understand the different kinds of silk
- To learn the techniques of cultivation of Mulberry
- To gain knowledge about cocoon harvesting technology
- To develop technical skills on culture, rearing, harvesting and marketing management

## M.Sc. ZOOLOGY (2024-25)

### SEMESTER – IV

### MZOL 07, LAB COURSE-7

(Syllabus & Scheme of Marks allotment in Practical examination)

1. Collection and identification of insects.
2. Study of permanent slides of insects.
3. Exercise based on population ecology.
4. Exercise based on animal physiology.
5. Collection and identification of fishes/internal parasites of fish, frog and goat/earthworms/bees(according to the elective paper opted by the student).
6. Study of permanent slides of fishes/ parasites/earthworms/bees (according to the elective paperopted by the student).

#### EXAMINATION SCHEME

SN	EXERCISES	Marks
1.	Identification of insects	10
2.	Exercise based on population ecology	10
3.	Exercise based on animal physiology	10
4.	Identification of fishes or internal parasites or earthworms and bees (according to the elective paper opted by the student).	10
5.	Exercise based on histology	05
6.	Spotting	20
7.	Viva	15
8.	Sessional	20
9.	Total -	100

#### Course Outcomes

After successful completion of these courses the student would be able:

- To explain the preservation techniques for fishes and disease control measures

- To cultivate skills to understand vermiculture
- To learn the techniques of apiculture and prawn culture
- To develop technical skills on culture, rearing, harvesting and marketing management
- To gain knowledge about poultry management

**M.Sc. ZOOLOGY (2024-25)**  
**SEMESTER – IV**  
**MZOL 08, LAB COURSE - 8**  
 (Syllabus & Scheme of Marks allotment in Practical examination)

**PROJECT WORK – 100 MARKS**

- Project work to be done by each student based on theoretical and experimental works.
- Evaluation of project work will be according to following criteria:

**EVALUATION SCHEME**

S.NO.	CRITERIA	MARKS
1.	Relevance of the topic	10
2.	Write-up on standard parameters	50
3.	Presentation skill	30
4.	Discussion	10
<b>TOTAL -</b>		<b>100</b>

The syllabus for lab. Course M. Sc. ZOOLOGY, Sem. - IV is hereby approved for the Session 2024 -25  
 Name and Signatures

<p>Chairperson/H.O.D </p> <p>.....</p> <p>University Nominee </p> <p>.....</p> <p>Subject Expert </p> <p>.....</p> <p>Subject Expert </p> <p>.....</p> <p>Representative from Industry/entrepreneur </p> <p>.....</p> <p>Student representative </p> <p>.....</p> <p>Other Prof. from Science faculty </p> <p>.....</p>	<p style="text-align: center;">Departmental members</p> <p>1.....</p> <p>2..... </p> <p>3.....</p> <p>4..... </p> <p>5..... </p> <p>6..... </p> <p>7..... </p> <p>8..... </p>
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## GENERAL INSTRUCTIONS FOR STUDENTS

1. The candidate has to obtain minimum 20% marks in each theory paper and internal assessment separately.
2. The candidate has to secure minimum 36% marks as an aggregate in order to pass that semester examination.
3. The internal assessment shall include class test, home assignment and seminar presentation.
4. In internal assessment, the marks taken into consideration will be the average of two tests (i.e. the class test and the home assignment) for each paper and shall of 20 marks.
  - a. The seminar shall be in lieu of class test and home assignment combined and shall be of 20 marks.
  - b. There shall be one seminar in each semester.
  - c. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

## DIRECTIVES FOR STUDENTS, FACULTY AND EXAMINERS

1. There shall be three sections (Section A, B, and C) in each theory paper.
2. Section A shall contain very short answer type questions (One or two line answer) or objective type questions (fill in the blank, not multiple choice questions).
3. Section B shall contain short answer type questions with the limit of 250 words.
4. Section C shall contain long answer/ descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 450 words.
5. The students are required to study the content mentioned in the curriculum exhaustively.

## EVALUATION PATTERN

➤ Theory 80 marks = 04 Credits

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
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#### Internal Assessment 20 marks = 01 credit

- Unit test – One class test in each theory paper comprising 20 marks. (containing two short answer type questions of 05 marks each and 05 objective type questions of 10 marks).
  - Home assignments – Two long answer type questions from each theory paper containing 10 marks each. The answer should be prepared with the help of standard reference books. (The titles of those books, authors, year of publication and publishers details should be mentioned in an appropriate way, at the end of each assignment).
  - Seminar presentations (Power point) – Comprising 20 marks.  
Each student has to be prepare one seminar in each semester. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).
- Practical 200 marks = 08 credits  
Two practicals of 100 marks each

#### CREDIT ALLOTMENTS

- Theory Paper = 05 credits (04+01)
- Practical = 04/ 08 credits

#### TOTAL CREDITS/ SEMESTER


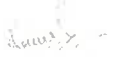




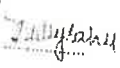




- Science Subjects with 04 theory papers (100 each) and one /two practical ( 100 each) – 20 + 08 =28 credits
- Science Subjects with 05 theory papers (no practical-Maths) – 25 credits
- Arts Subjects with 04 theory papers – 20 credits
- Arts Subjects with 05 theory papers – 25 credits
- Commerce subject with 05 theory papers – 25 credits

#### TOTAL CREDITS / PROGRAMME

- 16 Theory + 08 Practical + Project work – 80 + 32 + 08 = 120 credits
- 20 Theory – 100 credits (Maths)
- 20 Theory – 100 credits (Arts and Commerce)
- 16 Theory – 80 credits (Arts)

The syllabus (M. Sc. ZOOLOGY, Sem. - IV) is hereby approved for the Sessions 2024 -25

Name and Signatures

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