

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM & MARKING SCHEME

B.Sc. PART – II & III ZOOLOGY

SESSION : 2022-23



ESTD: 1958

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

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

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

Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email – autonomousdurg2013@gmail.com

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM AND MARKING SCHEME

B. Sc. PART – II & III

ZOOLOGY

SESSION: 2022-23



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

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

NAAC Grade- 'A+', CPE Phase-III, DBT-Star College

Ph./ Fax: 0788-2359688,

Website: www.govtsciencecollegedurg.ac.in

In case of any change or modification is prescribed by central board of studies of Higher Education Department, Government of Chhattisgarh with respect to content or distribution of marks for undergraduate syllabi, it will be implemented accordingly.

**GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
DEPARTMENT OF ZOOLOGY
SESSION 2022-23**

Learning Outcome Based curriculum for B. Sc. Zoology

Program Specific Outcome (PSO): B. Sc. Zoology

The programme enables the students to:

- Acquire knowledge on the various aspects of life sciences, cell biology, genetics, taxonomy, physiology, applied zoology, general embryology and public health.
- Understand good laboratory practices and safety, Carry out experimental techniques and methods of Physiology, Cell biology, pathology, Genetics, Applied Zoology, Biological techniques, Toxicology, Entomology, Sericulture, Biochemistry, microtomy.
- Understand the applications of biological sciences in Biotechnology, Apiculture, Poultry, Fisheries, Aquaculture, Agriculture and vermiculture.
- Gained the knowledge to use modern sophisticated equipments and tools.
- Recognize the scientific facts behind natural phenomena.

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
DEPARTMENT OF ZOOLOGY
B.Sc. II/ B.Sc. III

Approved syllabus for B. Sc. II/ B. Sc. III by the members of Board of Studies for the Session 2022- 23

The syllabus with the paper combinations is as under

B.Sc. II:

Course Code – BZO03 Paper I: VERTEBRATE ANATOMY AND PHYSIOLOGY	Course Code – BZO04 Paper II: VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY, EVOLUTION, BEHAVIOUR AND APPLIED ZOOLOGY
BZOL 02, Lab Course I: LAB COURSE	

B.Sc. III:

Course Code – BZO05 Paper I: ECOLOGY, ENVIRONMENTAL BIOLOGY, TOXICOLOGY, MICRO BIOLOGY AND MEDICAL ZOOLOGY	Course Code – BZO06 Paper II: GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES
BZOL 03, Lab Course I/ Practical: LAB COURSE	

The syllabus for B.Sc. is hereby approved for the session 2022-23

Name and Signatures

Chairperson /H.O.D <i>[Signature]</i> 25/7/22	Departmental members
Subject Expert <i>R.P. Dixi</i>	1. <i>[Signature]</i> 25/7/22
Subject Expert <i>[Signature]</i> 25/7/22	2. <i>[Signature]</i>
Subject Expert <i>[Signature]</i>	3. <i>[Signature]</i>
Representative from Industry/entrepreneur <i>[Signature]</i>	4. <i>[Signature]</i>
Student representative <i>[Signature]</i>	5.
Other prof. from Science faculty <i>[Signature]</i>	6.
	7.
	8.

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

DEPARTMENT OF ZOOLOGY

Syllabus and Marking Scheme for B. Sc. II

Session 2022-23

Paper No.	Course Code/Title of the Paper	Marks Allotted in Theory	
		Max	Min
I	BZO03/VERTEBRATE ANATOMY AND PHYSIOLOGY	50	17
II	BZO04/VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY, EVOLUTION, BEHAVIOUR & APPLIED ZOOLOGY	50	17
III	BZOL02, LAB COURSE	50	17
	Total	150	

02 Theory papers - 100
 01 Practical - 50
 Total Marks - 150

The syllabus and marking scheme for B. Sc. II is hereby approved for the session 2022-23

Name and Signatures

Chairperson /H.O.D	<i>[Signature]</i> 25/7/22	Departmental members
Subject Expert	<i>[Signature]</i>	1. <i>[Signature]</i> 25/7/22
Subject Expert	<i>[Signature]</i> 25/7/22	2. <i>[Signature]</i>
Subject Expert	<i>[Signature]</i>	3. <i>[Signature]</i>
Representative from Industry/entrepreneur	<i>[Signature]</i>	4. <i>[Signature]</i>
Student representative	<i>[Signature]</i>	5.
Other prof. from Science faculty	<i>[Signature]</i>	6.
		7.
		8.

Govt. V.Y.T. PG Autonomous College, Durg

B. Sc. II

ZOOLOGY

Session 2022-23

Paper I

Course Code – BZO03

ANATOMY AND PHYSIOLOGY

Comparative Anatomy of various organ systems of Vertebrates

UNIT-1

Max. M. - 50

Min. M. - 17

1. Integument and its derivatives: Structure of Scales, Hair and Feathers
2. Alimentary canal and Digestive glands in Vertebrates
3. Respiratory organs: Gills and lungs, Air sac in birds

UNIT- 2

1. Endoskeleton – (a) Axial Skeleton: Skull and vertebrae
(b) Appendicular skeleton: Limbs and Girdles
2. Circulatory System-Evolution of Heart and Aortic Arches
3. Urino-genital System –Kidney and Excretory ducts

UNIT- 3

- 1 Nervous system –General plan of Brain and Spinal Cord
- 2 Ear and Eye: Structure and function
- 3 Gonads and Genital ducts

UNIT- 4

- 1 Digestion and absorption of dietary components
- 2 Physiology of Heart, Cardiac Cycle and ECG
- 3 Blood coagulation
- 4 Respiration – Mechanism and control of breathing

UNIT-5

- 1 Excretion- Physiology of excretion and Osmoregulation
- 2 Physiology of Muscle contraction
- 3 Physiology of Nerve impulse and Synaptic transmission

Course Outcomes

After successful completion the student would be able:

- ❖ To explain the comparative anatomy of various organ systems of vertebrates
- ❖ To evaluate the physiological functioning of different organs.

List of Reference Books

1. Outlines of Biochemistry: Conn, Stumpy RK, Bruening and D.C
2. Review of Medical Physiology Gavlong :
3. Animal Physiology (W.H. Freeman) Eckest,R:
4. Analysis of Vertebrate structure, Hildbrand;
5. Outline of Comparative anatomy (Central Book Depot), Kingsley:
6. The Vertebrate body (Saunders), Rouer & Parsons:
7. Biology of the Vertebrates (Mac-Milan), Walta & Gyles

The syllabus for B. Sc. II Paper I is hereby approved for the session 2022-23

Name and Signatures

Chairperson /H.O.D <i>[Signature]</i> 25/7/22	Departmental members
Subject Expert <i>R.P. Divakar</i>	1. <i>[Signature]</i> 25/7/22
Subject Expert <i>[Signature]</i> 25/7/22	2. <i>[Signature]</i> 25/7/22
Subject Expert <i>[Signature]</i>	3. <i>[Signature]</i>
Representative from Industry/entrepreneur <i>[Signature]</i>	4. <i>[Signature]</i>
Student representative <i>[Signature]</i>	5.
Other prof. from Science faculty <i>[Signature]</i>	6.
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Govt. V.Y.T. PG Autonomous College, Durg

B.Sc. II

ZOOLOGY

Session 2022-23

Paper II

Course Code – BZO04

**VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY,
BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY**

UNIT- 1

Max. M. - 50

Min. M. - 17

1. Structure and function of endocrine gland.
2. Hormone receptor
3. Biosynthesis and secretion of Thyroid, Adrenal, Ovarian and Testicular hormones.
4. Endocrine disorder of pituitary, thyroid, adrenal and pancreas.

UNIT-2

1. Reproductive cycle in vertebrate.
2. Menstruation, lactation and pregnancy.
3. Mechanism of parturition.
4. Hormonal regulation of Gametogenesis.

UNIT-3

1. Evidences of organic evolution.
2. Theories of organic evolution.
3. Variation, mutation, isolation and natural selection.
4. Evolution of horse.

UNIT-4

1. Introduction to Ethology: Branches and concepts of Ethology
2. Patterns of behaviour: taxes, reflexes, drives and stereotyped behaviour.
3. Reproductive behavioral patterns.
4. Drugs and behavior, Hormones and behaviour.

UNIT-5

1. Prawn culture
2. Sericulture
3. Apiculture
4. Pisciculture

- 5. Poultry keeping
- 6. Elements of pest control: Chemical control and Biological control

Course Outcomes

After successful completion the student would be able:

- ❖ To understand the hormonal regulation of physiological processes in vertebrates
- ❖ to appreciate the basic concepts of hormonal regulation of reproduction in vertebrates
- ❖ to understand the environmental influence and ecological aspects of behavior
- ❖ to understand Animal behavior and response of animals to different instincts
- ❖ To understand the scope of aquaculture

List of reference books

- Reproductive endocrinology by Gayatri Prakash.
- Unified Zoology by Sexsena.

The syllabus for B. Sc. II paper II is hereby approved for the session 2022-23

Name and Signatures:

<p>Chairperson /H.O.D Subject Expert <i>R.P. Sharma</i> 25/12/22 Subject Expert <i>Sumit</i> 25/12/22 Subject Expert <i>Chhanna</i> Representative from Industry/entrepreneur Student representative <i>Satyam</i> Other prof. from Science faculty</p>	<p>Departmental members</p> <p>1. <i>R.P. Sharma</i> 25/12/22 2. <i>Harsh</i> 3. <i>Harsh</i> 4. <i>Seiha</i> 5. 6. 7. 8.</p>
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Govt. V.Y.T. PG Autonomous College, Durg

B.Sc. II

ZOOLOGY

Session 2022-23

BZOL02, Lab. Course II

The practical work in general shall be based on the syllabus prescribed. The students will be required to show the knowledge of the following:

1. Study of the representative examples of the different chordates (classification and character)
2. Dissection of various systems of Scoliodon- Afferent and Efferent Branchial vessels, Cranial nerves and Internal ear
3. Alternative methods by clay/thermocool/drawing/model etc
4. Simple microscopic technique through unstained or stained permanent mounts
5. Study of permanent slides for histological study, as per theory papers
6. Study of limb girdles and vertebrae of Frog, Varanus, Fowl and Rabbit
7. Identification of species and individuals of Honey bee
8. Life cycle of Honey bee and Silkworm
9. Exercise based on evolution and animal behaviour

Course Outcomes

After successful completion the student would be able:

- ❖ To understand the hormonal regulation of physiological processes in vertebrates
- ❖ To explain the comparative anatomy of various organ systems of vertebrates
- ❖ To understand the environmental influence and ecological aspects of behavior
- ❖ To understand the scope of aquaculture

Scheme of Practical Exam

Time- 3.30 Hrs.

Max. M - 50

Min. M. - 17

1. Major dissection (cranial nerves/ Efferent branchial vessel)	10
2. Exercise based on evolution	05
3. Exercise based on Applied Zoology	05
4. Exercise based on animal behavior	05
5. Spotting 8 (slides 4 bones 2 specimens2)	16
6. Viva	05
7. Sessional marks	05
Total	50

The syllabus for B.Sc. II year Practical is hereby approved for the session 2022-23.

Name and Signatures

<p>Chairperson /H.O.D</p> <p>Subject Expert <i>R.P. Singh</i></p> <p>Subject Expert <i>Samuel</i></p> <p>Subject Expert <i>Chaffin</i></p> <p>Representative from Industry/entrepreneur</p> <p>Student representative <i>Sallysalw</i></p> <p>Other prof. from Science faculty</p>	<p>Departmental members</p> <p>1. <i>Diny</i> 25/7/22</p> <p>2. <i>N.A. Singh</i></p> <p>3. <i>Manoj</i> 25/7</p> <p>4. <i>Seeha</i></p> <p>5.</p> <p>6.</p> <p>7.</p> <p>8.</p>
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DEPARTMENT OF ZOOLOGY
Syllabus and Marking Scheme for B.Sc. III
Session 2022-23

Paper No.	Title of the Paper	Marks Allotted in Theory	
		Max	Min
I	BZO05/ECOLOGY, ENV. BIOLOGY, TOXICOLOGY, MICRO BIOLOGY AND MEDICAL ZOOLOGY	50	17
II	BZO06/GENETICS, CELL PHYSIOLOGY, BIOCHEM., BIOTECH., & BIOTECHNIQUE	50	17
III	BZOL03, LAB COURSE	50	17
	Total	150	

02 Theory papers - 100
 01 Practical - 50
 Total Marks - 150

The syllabus and marking scheme for B. Sc. III is hereby approved for the session 2022-23

Name and Signatures

Chairperson /H.O.D	..... .....	Departmental members	1.
Subject Expert	..... .....		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

B.Sc. III

ZOOLOGY

Session 2022-23

Paper I

Course Code – BZO05

**ECOLOGY, ENVIRONMENTAL BIOLOGY, TOXICOLOGY, MICROBIOLOGY AND
MEDICAL ZOOLOGY**

Unit: I (Ecology)

Max. M. 50

- Aims and scopes of ecology
- Major ecosystems of the world-Brief introduction
- Population- Characteristics and regulation of densities
- Communities and ecosystem
- Bio-geo chemical cycles
- Air & water pollution
- Ecological succession

Min. M. 17

Unit: II (Environmental Biology)

- Laws of limiting factor
- Food chain in fresh water ecosystem
- Energy flow in ecosystem- Trophic levels
- Conservation of natural resources
- Environmental impact assessment

Unit: III (Toxicology)

- Definition and classification of Toxicants
- Basic Concept of toxicology
- Principal of systematic toxicology
- Heavy metal Toxicity (Arsenic, Murcury, Lead, Cadmium)
- Animal poisons- snake venom, scorpion & bee poisoning
- Food poisoning

Unit: IV (Microbiology)

- General and applied microbiology
- Microbiology of domestic wsater and sewage
- Microbiology of milk & milk products
- Industrial microbiology: fermentation process, production of penicillin, alcoholic breverages, bioleaching.

Unit:V (Medical Zoology)

- Brief introduction to pathogenic microorganisms, Ricketssia, Spirochaetes, AIDS and Typhoid
- Brief account of life history & pathogenicity of the following pathogens with reference to man: prophylaxis & treatment
- Pathogenic protozoan's- Entamoeba, Trypanosome & Plasmodium
- Pathogenic helminthes- Schistosoma

- Nematode pathogenic parasites of man
- Vector insects

Course Outcomes

After successful completion the student would be able:

- ❖ To understand the basic theories and principles of ecology, ecosystems and their functioning
- ❖ To be aware of toxicants, their impacts on environment and remedial measures
- ❖ To understand the microbial world, its structure and function and to familiarize with the applied aspects of microbiology
- ❖ To make them aware of the pathogens, health related problems, their origin and treatment

Reference books

- Unified Zoology by Sexsena.
- Ecology and Environment by P. D. Sharma.
- Toxicology by Sood.
- Parasitology by K. D. Chatterjii.
- Unified zoology- Yugbodh Prakashan.

The syllabus for B.Sc. III paper I is hereby approved for the session 2022-23

Name and Signatures

Chairperson /H.O.D <i>[Signature]</i> 25/7/22	Departmental members
Subject Expert <i>R.P. Singh</i> 25/7/22	1. <i>[Signature]</i> 25/7/22
Subject Expert <i>[Signature]</i> 25/7/22	2. <i>[Signature]</i> 25/7/22
Subject Expert <i>[Signature]</i>	3. <i>[Signature]</i> 25/7/22
Representative from Industry/entrepreneur <i>[Signature]</i>	4. <i>[Signature]</i>
Student representative <i>[Signature]</i>	5.
Other prof. from Science faculty <i>[Signature]</i>	6.
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Govt. V.Y.T.P.G. Autonomous College, Durg

B.Sc. III

ZOOLOGY

Session 2022-23

Paper II

Course Code – BZO06

GENETICS, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES

Unit: I (Genetics)

Max. M. 50

- Linkage & linkage maps, Sex Determination and Sex Linkage **Min. M. 17**
- Gene interaction- Incomplete dominance & Codominance, Supplementary gene, Complementary gene, Epistasis Lethal gene, Pleiotropic gene and multiple alleles.
- Mutation: Gene and chromosomal mutation
- Human genetics: chromosomal alteration: Down, Edward, Patau, Turner and Klinefelter Syndrome Single gene disorders: Alkaptonuria, Phenylketonuria, Sickle cell anemia, albinism and colour blindness

Unit: II (Cell Physiology)

- General idea about pH & buffer
- Transport across membrane: Diffusion and Osmosis
- Active transport in mitochondria & endoplasmic reticulum
- Enzymes-classification and Action

Unit: III (Biochemistry)

- Amino acids & peptides- Basic structure & biological function
- Carbohydrates & its metabolism- Glycogenesis; Gluconeogenesis; Glycolysis; Glycogenolysis; Cose-cycle
- Lipid metabolism- Oxidation of glycerol; Oxidation of fatty acids
- Protein Catabolism- Deamination, transamination, transmethylation

Unit: IV (Biotechnology)

- Application of Biotechnology
- Recombinant DNA & Gene cloning
- Cloned genes & other tools of biotechnology (Tissue culture, Hybridoma, Transgenic Animals and Gene library)

Unit: V (Biotechniques)

Principles & techniques about the following:

- pH meter
- Colorimeter
- Microscopy- Light microscopes: Compound, Phase contrast & Electron microscopes
- Centrifuge
- Separation of biomolecules by chromatography & electrophoresis

Course Outcomes

After successful completion the student would be able:

- ❖ To get an in depth understanding of human genetics and genetic disorders
- ❖ To develop critical thinking, skill and research aptitude in the frontier areas of the biochemistry and biotechnology
- ❖ To understand the basic principle applications of analytical and separation techniques.

Reference book:

- Unified Zoology by Dr. S. M. Saxena.
- Genetics and Developmental Biology by Veerbala Rastogi.
- Animal Physiology and Biochemistry by S. P.Mishra.
- Tools and Technique by P. K. Bajpayee.

The syllabus for B.Sc. III year paper II is hereby approved for the session 2022-23

Name and Signatures

Chairperson /H.O.D	.....	Departmental members
Subject Expert	R.P. 25/7/22	1. 25/7/22
Subject Expert	25/7/22	2. 25/7
Subject Expert	25/7/22	3. 25/7
Representative from Industry/entrepreneur	.....	4. 25/7
Student representative	.....	5.
Other prof. from Science faculty	.....	6.
.....	.....	7.
.....	.....	8.

Govt. V.Y.T. PG Autonomous College, Durg
B.Sc. III
ZOOLOGY
Session 2022-23
BZOL03, Lab. Course

The practical work in general shall be based on syllabus prescribed in theory. The candidates will be required to show knowledge of the following:

- Estimation of population density, percentage frequency, relative density.
- Analysis of producers and consumers in grassland.
- Detection of gram-negative and gram-positive bacteria.
- Blood group detection (A,B,AB,O)
- R. B. C. and W.B.C count
- Blood coagulation time
- Preparation of hematin crystals from blood of rat
- Observation of Drosophila, wild and mutant.
- Chromatography-Paper or gel.
- Colorimetric estimation of Protein.
- Mitosis in onion root tip.
- Biochemical detection of Carbohydrate, Protein and Lipid.
- Study of permanent slides of parasites, based on theory paper.
- Working principles of pH meter, colorimeter, centrifuge and microscope.

Scheme of marks distribution

Time: 3:30hrs

• Hematological Experiment	08
• Ecological Experiment: Grassland Ecosystem/	06
• Population Density/Frequency/relative density	
• Bacterial staining	05
• Biochemical experiment	06
• Practical based on Instrumentation (Chromatography/ pH meter/microscope/centrifuge.	05
• Spotting (5 spots)	10
• Viva	05
• Sessional	05

Course Outcomes

After successful completion the student would be able:

- ❖ To develop critical thinking, skill and research aptitude in the frontier areas of the biochemistry and biotechnology
- ❖ To understand the basic principle applications of analytical and separation techniques.
- ❖ To understand the basic theories and principles of ecology, ecosystems and their functioning
- ❖ To be aware of toxicants, their impacts on environment and remedial measures
- ❖ To understand the microbial world, its structure and function and to familiarize with the applied aspects of microbiology
- ❖ To make them aware of the pathogens, health related problems, their origin and treatment

The syllabus for B.Sc. III practical is hereby approved for the session 2022-23

Name and Signatures

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

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 150 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 350 words.
5. The students are required to study the content mentioned in the curriculum exhaustively.

EVALUATION PATTERN

- Theory 33/34/50/75 marks
- Practical 50 marks

Question Type	MM 33 (Marks X No. of Q.)	MM 34 (Marks X No. of Q.)	MM 50 (Marks X No. of Q.)	MM 75 (Marks X No. of Q.)
A (Very short Ans.)	8X1 = 08	1X9 = 09	1X10 = 10	01X10 = 10
B (Short Ans.)	2X5 = 10	2X5 = 10	3X5 = 15	5X5 = 25
C (Long Ans.)	3X5 = 15	3X5 = 15	5X5 = 25	8X5 = 40

The evaluation pattern for B.Sc. I, II & III is hereby approved for the session 2022-23

Name and Signatures

<p>Chairperson /H.O.D <i>[Signature]</i> 25/7/22</p> <p>Subject Expert <i>[Signature]</i> 25/7/22</p> <p>Subject Expert <i>[Signature]</i> 25/7/22</p> <p>Subject Expert <i>[Signature]</i></p> <p>Representative from Industry/entrepreneur <i>[Signature]</i></p> <p>Student representative <i>[Signature]</i></p> <p>Other prof. from Science faculty <i>[Signature]</i></p>	<p>Departmental members</p> <p>1. <i>[Signature]</i> 25/7/22</p> <p>2. <i>[Signature]</i> 25/7/22</p> <p>3. <i>[Signature]</i> 25/7/22</p> <p>4. <i>[Signature]</i></p> <p>5.</p> <p>6.</p> <p>7.</p> <p>8.</p>
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