Syllabus For

Bachelor of Science in Zoology (General)

Under Choice Based Credit System

Academic Session

w.e.f. 2020-2023

For

All Constituents / Affiliated Colleges Under

BINOD BIHARI MAHTO KOYALANCHAL UNIVERSITY,

DHANBAD, JHARKHAND

CONTENT

Semester	Group-A	Group-B	Group-C
Sem-I	Animal diversity & Diversity ZOO-G-DSC-101A-T ZOO-G-DSC-101A-P	Diversity of Non-Chordates ZOO-G-DSC-102A-T ZOO-G-DSC-102A-P	Biomics of Animal Diversity ZOO-G-DSC-103A-T ZOO-G-DSC-103A-P
Sem-II	Cell Biology, Genetics and Evolution ZOO-G-DSC-201B-T ZOO-G-DSC-201B-P	Diversity of Chordates ZOO-G-DSC-202B-T ZOO-G-DSC-202B-P	Biochemistry Physiology & Development Biology ZOO-G-DSC-203B-T ZOO-G-DSC-203B-P
Sem-III	Biochemistry, Physiology & Development biology ZOO-G-DSC-301C-T ZOO-G-DSC-301C-P	Biochemistry & Physiology ZOO-G-DSC-302C-T ZOO-G-DSC-302C-P	Cell Biology , Genetic & Endocrinology ZOO-G-DSC-303C-T ZOO-G-DSC-303C-P
Sem-IV	Ecology & Economic Zoology ZOO-G-DSC-401D-T ZOO-G-DSC-401D-P	Genetics , Evolution & Animal Behaviour ZOO-G-DSC-402D-T ZOO-G-DSC-402D-P	Molecular Biology, Biotechnology & Medical Zoology ZOO-G-DSC-403D-T ZOO-G-DSC-403D-P
Sem-V	Immunology & Microbiology ZOO-G-DSE-501A-T ZOO-G-DSE-501A-P	Wild life Conservation ZOO-G-DSE-502A-T ZOO-G-DSE-502A-P	Reproductive Biology ZOO-G-DSE-503A-T ZOO-G-DSE-503A-P
Sem-VI	Biostatistics ZOO-G-DSE-601B-T ZOO-G-DES-601B-P	Pest Management ZOO-G-DSE-602B-T ZOO-G-DSE-602B-P	Fish & Aquaculture ZOO-G-DSE-603B-T ZOO-G-DSE-603B-P

Note: The candidates will have to select either Group A, B, or C for all six semester. No students will be allowed to opt. two different groups.

Proposed Scheme for Choice Based Credit System In B.Sc. Generic Elective Program

Semester I

Course	Course Code	Name of Papers	Full Marks	End Semester (Ext. Marks)	Mid Semester (Int. marks)
Generic Elective	ZOO-G-DSC-101A-T (04 Credits 60 Lectures)	Animal Classification & Diversity	75	60	15
	ZOO-G-DSC-101A-P (02 Credits 30 Lectures)	Practical	25	20	05
	ZOO-G-DSC-102A-T (04 Credits 60 Lectures)	Diversity: non-Chordates	75	60	15
	ZOO-G-DSC-102A-P (04 Credits 60 Lectures)	Practical	25	20	05
	ZOO-G-DSC-103A-T (04 Credits 60 Lectures)	Biomic& Animal Diversity	75	60	15
	ZOO-G-DSC-103A-P (04 Credits 60 Lectures)	Practical	25	20	05
AECC	ZOO-G-AECC-101-T (02 Credits, 30 Lectures)		50	40	10

Semester II

Course	Course Code	Name of Papers	Full Marks	End Semester (Ext. Marks)	Mid Semester (Int. marks)
Generic Elective	ZOO-G-DSC-201B-T (04 Credits 60 Lectures)	Cell Biology, Genetics & Evolution	75	60	15
	ZOO-G-DSC-201B-P (02 Credits 30 Lectures)	Practical	25	20	05
	ZOO-G-DSC-202B -T (04 Credits 60 Lectures)	Diversity of Chordates	75	60	15
	ZOO-G-DSC-202B-P (04 Credits 60 Lectures)	Practical	25	20	05
	ZOO-G-DSC-203B-T (04 Credits 60 Lectures)	Biochemistry, Physiology & Developmental	75	60	15
	ZOO-G-DSC-203B-P (04 Credits 60 Lectures)	Practical	25	20	05
AECC	ZOO-G-AECC-202-T (02 Credits, 30 Lectures)		50	40	10

Semester III

Course	Course Code	Name of Papers	Full Marks	End Semester (Ext. Marks)	Mid Semester (Int. marks)
Generic Elective	ZOO-G-DSC-301C-T (04 Credits 60 Lectures)	Biochemistry, Physiology & Developmental Biology	75	60	15
	ZOO-G-DSC-301C-P (02 Credits 30 Lectures)	Practical	25	20	05
	ZOO-G-DSC-302C-T (04 Credits 60 Lectures)	Biochemistry, Physiology	75	60	15
	ZOO-G-DSC-302C-P (04 Credits 60 Lectures)	Practical	25	20	05
	ZOO-G-DSC-303C-T (04 Credits 60 Lectures)	Cell Biology, Genetics & Endocrinology	75	60	15
	ZOO-G-DSC-303C-P (04 Credits 60 Lectures)	Practical	25	20	05
SEC (Skill Enhancement Course)	ZOO-G-SEC-301-T (02 Credits, 30 Lectures)		50	40	10

Semester IV

Course	Course Code	Name of Papers	Full Marks	End Semester (Ext. Marks)	Mid Semester (Int. marks)
Generic Elective	ZOO-G-DSC-401D-T (04 Credits 60 Lectures)	Ecology & Economic Zoology	75	60	15
	ZOO-G-DSC-401D-P (02 Credits 30 Lectures)	Practical	25	20	05
	ZOO-G-DSC-402D-T (04 Credits 60 Lectures)	Genetics, Evolution & Animal Behaviour	75	60	15
	ZOO-G-DSC-402D-P (04 Credits 60 Lectures)	Practical	25	20	05
	ZOO-G-DSC-403D-T (04 Credits 60 Lectures)	Molecular Biology, Biotechnology & Medical Zoology	75	60	15
	ZOO-G-DSC-403D-P (04 Credits 60 Lectures)	Practical	25	20	05
SEC (Skill Enhancement Course)	ZOO-G-SEC-402-T (02 Credits, 30 Lectures)		50	40	10

Semester V

Course	Course Code	Name of Papers	Full Marks	End Semester (Ext. Marks)	Mid Semester (Int. marks)
Generic Elective	ZOO-G-DSE-501A-T (04 Credits 60 Lectures)	Immunology & Microbiology	75	60	15
	ZOO-G-DSE-501A-P (02 Credits 30 Lectures)	Practical	25	20	05
	ZOO-G-DSE-502A-T (04 Credits 60 Lectures)	Wild life Conservation	75	60	15
	ZOO-G-DSE-502A-P (04 Credits 60 Lectures)	Practical	25	20	05
	ZOO-G-DSE-503A-T (04 Credits 60 Lectures)	Reproduction Biology	75	60	15
	ZOO-G-DSE-503A-P (04 Credits 60 Lectures)	Practical	25	20	05
SEC (Skill Enhancement Course)	ZOO-G-SEC-503-T (02 Credits, 30 Lectures)		50	40	10

Semester V I

Course	Course Code	Name of Papers	Full Marks	End Semester (Ext. Marks)	Mid Semester (Int. marks)
Generic Elective	ZOO-G-DSE-601B-T (04 Credits 60 Lectures)	Biostatistics	75	60	15
	ZOO-G-DSE-601B-P (02 Credits 30 Lectures)	Practical	25	20	05
	ZOO-G-DSE-602B-T (04 Credits 60 Lectures)	Pest Management	75	60	15
	ZOO-G-DSE-602B-P (04 Credits 60 Lectures)	Practical	25	20	05
	ZOO-G-DSE-603B-T (04 Credits 60 Lectures)	Fish & Aquaculture	75	60	15
	ZOO-G-DSE-603B-P (04 Credits 60 Lectures)	Practical	25	20	05
SEC (Skill Enhancement Course)	ZOO-G-SEC-604-T (02 Credits, 30 Lectures)		50	40	10

Members of Board of Studies of CBCS under Graduate Syllabus as Per Guidelines of BinodBihariMahtoKoyalanchal University, Dhanbad

Sl. No.	Name	Signature
1.	Dr. Shailendra Kumar Sinha – Chairman Associate Professor Head University Dept. of Zoology BBMKU, Dhanbad	
2.	Dr. Birendra Kumar, -Invited Member Associate Professor Dean Faculty of Science, BBMKU, Dhanbad	
3.	Dr. LalBihari Singh - Member DSW, BBMKU, Dhanbad.	
4.	Dr. K. K. Gupta - Expert Member Associate Professor University Dept. of Zoology, VBU, Hazaribag.	
5.	Dr. Ajay Kumar Choudhary, - Expert Member Associate Professor, University Dept. of Zoology, DSPMU, Ranchi.	
6.	Dr. Navita Gupta - Member Associate Professor, University Dept. of Zoology, BBMKU, Dhanbad.	
7.	Dr. RupamMallik, - Member Assistant Professor, University Dept. of Zoology, BBMKU, Dhanbad.	
8.	Dr, SaritaMurmu, - Member Assistant Professor, University Dept. of Zoology,	

BBMKU, Dhanbad.

9. Dr. B. N. Mahto, - Member
Assistant Professor
Dept. of Zoology, Chas College, Chas.

10. Sri S. C. Dan, - Member
Assistant Professor,
Department of Zoology,
R. S. More College, Govindpur.

B.Sc Zoology –General
B.Sc. First Year
Semester I
FM: 75 (External 60+15 Internal)

ZOO-G-DSC-101A-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Animal Classification & Diversity
Credit – 4 **Lectures – 60** **F.M: 75 (60 Ext. + 15 Int.)**

UNIT-1 General character and classification (up to classes) of the following phyla:
1.1 Protozoa, Porifera, Coelenterata, Platyhelminthes, Annelida, Mollusca, Arthropoda, Echinodermata &Hemichordata with Examples

UNIT-2 Non Chordates Form & Function

2.1.1 Protozoa: Pathogenecity, treatment & prevention of diseases caused by *Entamoebahistolytica*&*Leishmaniadonovani*
2.2 Protozoa: Structure and Reproduction of *Paramecium.*
2.3 Porifera: Canal system of *sycon*
2.4 Coelenterata: Life cycle of Obelia&Metagenesis
2.5. Platyhelminthes: *Taeniasolium* –life cycle & their pathogenicity
2.6. Aschelminthes: *Ascaris*- life cycle & their pathogenicity
2.7. Annelida: *Pheretima*- Excretory system
2.8. Arthropoda: *Palaemon*- Respiratory system, Metamorphosis in insects
2.9. Mollusca: *Pila*-Respiratory system
2.10. Echinodermata: *Asterias* – Water vascular System

UNIT-3 General character and classification of living chordates of the following Classes: Amphibia, Reptilia& Mammalia

UNIT-4 Study of following types

4.1. Pisces: Respiratory & Accessory Respiratory organs

4.2. Reptilia: Biting mechanism of snake, Poison gland , Venom
4.3. Aves: Flight Adaptation in Birds
4.4. Mammals: Characters, distribution and affinities of Prototheria

B.Sc. Zoology (General)
Semester I
Practical ZOO-G-DSC-101A-P
Classification & Animal diversity (20 External + 05 Internal)

Time: 1 and half Hr **FM:20**

1. **Dissection/Project:** **05**
2. **Mounting of given specimens** **02**
3. **Spotting**
   a. **Slides** **2×2=04**
   b. **Specimens**
      1. **Nonchordates (01) 2. Chordates (01)** **2×2=04**
4. **Practical Record & Viva** **05**

Total=20

List of suggested Practicals

1. **Dissection:**
   a. *Paleomon*-Nervous and Digestive system
   b. Local bony fishes: Afferent and Efferent branchial vessel.
2. **Mounting**: Spicules of Porifera, Obelia colony, Daphnia, trachea and salivary gland of cockroach, septalnephridia and sperm theca of Earthworm
3. **Museum Specimens:** *Sycon ,Euspongia, Aurelia, Gorgonia, Porpitta, Vallela, Metridium, Fungia, Tubipora, Pennatula, Meandrina, Tapeworm, Fasciola, Ascaries, Pheretima, Hirudinaria, Neries, Pila, Unio, Loligo, Sepia, Octopus*, Hermit Crab, Prawn, *Asterias*, Sea Urchin, Brittle star
4. **Permanent slides:** *Paramecium* Slide (WM),*Paramecium* Conjugation, L.S of *Sycon*, *Obelia* Colony, Medusa, Fasciola (W.M), Proglottids of Tapeworm, T.S of *Pheretima* through different regions,T.S of male & female *Ascaris*,
5. **Museum Specimens (Chordates**): *Torpedo, Scoliodon, Labeo, Exocoetus, Echenesis, Hippocampus, Bufo, Hyla, Salamandra, Draco, Naja, Chamaeleon*, Bat (Insectivorous and Frugivorous)
6. **Project:** To submit a Project Report on any related topic.

B.Sc Zoology (General)

Semester I

ZOO-G-DSC-102A-T

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- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
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DIVERSITY OF NON- CHORDATE

Credit – 4 Lectures – 60 F.M: 75 (60 Ext. + 15 Int.)

UNIT 1: Non – Chordates: General Characters and Classification of Different Phyla of Non- Chordates up to Classes with Examples Showing Distinctive and Adaptive Features:

1.1 Protozoa, Porifera, Coelenterata, Helminthes, Annelida, Arthropoda, Mollusca and Echinodermata.

UNIT 2: Non – Chordates: Protista to Pseudocoelomates

2.1 Protozoa: General account of Locomotion and Reproduction

2.2 Porifera:

2.2.1: Canal System in Sponges

2.2.2: Reproduction in Porifera

2.3 Coelenterata:

2.3.1: Structure, Life Cycle and Metagenesis in Obelia.

2.3.2: Corals and Coral Reefs: Types, Distribution and Formation

2.4 Ctenophora: General Account and its Significance.

2.5 Aschelminthes:

2.5.1: Morphology and Life Cycle of *Ascaris*

2.5.2: Parasitic Adaptation of *Ascaris*

UNIT 3: Eucoelomates

3.1 Annelida:

4.1.1: *Pheretima posthuma*: Morphology, Nephridial and Reproductive System.

3.2 Arthropoda:

3.2.1 *Palaemon*: Respiratory system.

3.2.2 Larval Forms of Crustacea

3.3 Mollusca:

3.3.1: Respiration in *Pila &Unio*

3.3.2: Torsion &Detorsion in Gastropods

3.4 Echinodermata:

3.4.1: Water Vascular System in Echinodermata

3.5. Hemichordates:

3.5.1: Balanoglossus

B.Sc Zoology (General)
Semester I
ZOO-G-DSC-102A-P
Practical F.M-25 (20 External + 05 Internal)

Practical	**Marks Distribution**
1. Dissection/ Project:	**04**
2. Slide Preparation:	**02**
3. Spotting:	**2×2=04**
a. Slides (01)	
b. Museum Specimen (01)	
4. Class record	**05**
5. Viva voce	**05**

Total=20

Suggested PracticalSuggested Practicals

1. **Study of Available Museum Specimen of animals**
   Sycon, Physalia, Metridium, Adamsia, Fasciola, Taeniasolium, Arenicola, Pheretima, Chiton, Pila, Unio, Nautilus, Sepia, Loligo, Octopus, Eupagurus, Limulus, millipedes, centipedes, Palaemon, Antedon, Asterias, Echinus,
2. **Study of the following through permanent slide**
   Paramecium (wm), Conjugation of *Paramecium*, *Obelia* colony, Medusa, Ephyra larva, Miracidium larva, Sporocyst larva, Redia larva, Cercaria larva, Glochidium larva, Nauplius, Zoea larva, Mysis larva, Megalopa larva, Bipinnaria larva, T.S. of earthworm through pharynx, Gizzard, Typhlosole
3. **Dissection:** Dissection of Digestive, Nervous and Reproductive system of Earthworm
4. **Mounting**: Mounting of Nephridia& Ovary of Earthworm
5. **Project** : To submit a Project Report on any related topic on life cycles/coral/coral reefs.

B.Sc Zoology (General)
Semester I

ZOO-G-DSC-103A-T

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- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
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BIOMIC &ANIMAL DIVERSITYTHEORY
(Credit- 4) Lectures-60

Unit 1. Protista
1.1 General characters of Protozoa; Life cycle of *Plasmodium*
Unit 2. Porifera
2.1 General characters and canal system in Porifera
Unit 3. Radiata
3.1 General characters of Cnidarians and polymorphism
Unit 4. Aceolomates
4.1 General characters of Helminthes; Life cycle of *Taeniasolium*
Unit 5. Pseudocoelomates
5.1 General characters of Nemethehelminthes; Parasitic adaptations
Unit 6. Coelomate Protostomes
6.1 General characters of Annelida ;Metamerism.
Unit 7. Arthropoda
7.1 General characters.Social life in insects.
Unit 8. Mollusca
8.1 General characters of mollusca; Pearl Formation
Unit 9. Coelomate Deuterostomes
9.1 General characters of Echinodermata, Water Vascular system in Starfish.
Unit 10. Protochordata
10.1 Salient features
Unit 11. Pisces
11.1 Osmoregulation, Migration of Fishes
Unit 12. Amphibia
12.1 General characters, Adaptations for terrestrial life, Parental care in Amphibia.
Unit 13. Reptilia
13.1 Amniotes; Origin of reptiles. Terrestrial adaptations in reptiles.
Unit 14. Aves:
14.1 The origin of birds; Flight adaptations
Unit 15. Mammalia
15.1 Early evolution of mammals; Primates; Dentition in

B.Sc Zoology (General)
Semester I Practical

ZOO-G-DSC-103A-P

F.M-25 (20 External + 05 Internal)
Credit-02 **Lectures-30** **F.M-20**

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1. Dissection/Project:	**04**
2. Mounting:	**02**
3. Spotting:	
a. Specimens: i) Non Chordates ii) Chordates	
b. Slides (01)	**3×2=06**
4. Sessional Records	**04**
5. Viva voce	**04**
	Total-20

Suggested Practical
1. Study of following specimens:

Non Chordates: *Euglena, Noctiluca, Paramecium, Sycon, ,Physalia, Tubipora, Metridium, Taenia, Ascaris, Nereis, Aphrodite, Leech, Peripatus, Limulus,* ,Hermitcrab, *Daphnia,* Millipede, Centipede, Beetle, *Chiton, Dentalium, Octopus, Asterias, and Antedon.*

Chordates*: Balanoglossus, Amphioxus, Petromyzon, Pristis, Hippocampus, Labeo, Icthyophis/Uraeotyphlus, Salamander, Rhacophorus Draco, Uromastix, Naja, Viper, model of Archaeopteryx,* any three common birds-*(Crow, duck, Owl),* Squirrel and Bat.

2. Study of following Permanent Slides:
Cross section of Sycon, Sea anemone and *Ascaris(*male and female*).* T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva.

3. Mounting:
a. Septal& pharyngeal nephridia of earthworm.
b. Unstained mounts of Placoid, cycloid and ctenoid scales.
4. Dissections:
a. Digestive and nervous system of Cockroach.
5. To submit a Project on any related topic.

B.Sc. Zoology (General)
Semester II

ZOO-G-DSC-201B-T

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- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Cell Biology, Genetics and Evolution, XYZ-G-DSC-201B-T
04 Credits, 60 Lectures

UNIT-1 Cell Structure & Functions

1.1 Study of structure & functions of Plasma membrane
1.2 Study of Cell Organelle- Mitochondia, E.R, Ribosome, Lysosome
1.3 Types and structure of a typical chromosome-
a. Ultrastructure of chromatin fiber-Nucleosome, Polytene and lampbrush chromosome
1.4 Cell Division: Mitosis, Meiosis their significance.

UNIT-2 Principle of Genetics

2.1 Mendels Law of Inheritance
2.2 Linkage & Crossing Over
2.3 DNA: Structure &Function

UNIT-3 Concept of gene expression

3.1 Semi conservative DNA Replication in Prokaryotes
3.2 Transcription in Prokaryotes
3.3 Translation in Prokaryotes

UNIT-4 Evolution

4.1 Theory of organic evolution; Lamarckism's theory of inheritance of acquired characters Criticism and Neo-Lamarckism
4.2 Darwin's theory of natural selection, Criticism and Neo-Darwinism

Semester II
Practical ZOO-G-DSC-201B-P
(02 Credits , 30 Lectures)

Cell Biology, Genetics & Evolution

Time: 1 and half Hr	**FM:20**
1. Pedigree Analysis (one)	**05**
2. Slide Preparation	**04**
3. Spotting	
a. Slides	**01×2=02**
b. Analogous/Homologous organs/ Fossils/Extinct Models	**2×2=04**
c. Practical Record & Viva	**05**
	Total=20

List of Suggested Practical's

1. Study of permanent slides of cell division (Mitosis/Meiosis)
2. Preparation of mitotic slides from onion root tips.
3. Study of Polytene and lampbrush chromosome through photographs
4. Study of sex linked characters: Hemophilia and colorblindness through Pedigree Analysis
5. Study of homologous and analogous organs
6. Study of some fossils/extinct models: Trilobites, Archaeopteryx

B.Sc Zoology (General)
Semester II

ZOO-G-DSC-202B-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
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- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

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DIVERSITY OF CHORDATES
Credit – 04 Lectures – 60 F.M: 75 (60 Ext. + 15 Int.)

UNIT 1. Protochordates& Primitive Chordates

1.1 Urochordata: General organization and Retrogressive Metamorphosis in Herdmania

1.2 Agnatha

1.2.1: General Characters & Classification

1.2.2: Differences between Petromyzon and Myxine.

UNIT 2. Higher Chordates: General Characters and Classification of Following up to Orders Giving Examples

2.1 Amphibia

2.2 Reptilia

2.3 Aves

2.4 Mammalia

UNIT 3. Fish &Amphibia

3.1 Fishes

3.1.1: Differences between Cartilagenous and Bony Fishes

3.1.2: Accessory Respiratory Organs in Teleosts

3.2 Amphibia

3.2.1: Origin & Evolution of Amphibia

3.2.2: Paedogenesis and Neoteny in Axolotl Larva

UNIT 4. Reptilia, Aves, & Mammalia and Comparative Anatomy

4.1 Reptilia

4.1.1: Poisonous and Non- poisonous Snakes of India
4.1.2: Poison Apparatus in Snakes
4.1.3: Biting Mechanism
4.1.4: Types of Venom and Their Toxic Effects

4.2 Aves

4.2.1: Flight Adaptation in Birds
4.2.2: Mechanism of Flight
4.2.3: Flightless Birds (Ratitae or Palaeognathae)

4.3 Mammalia & Primitive Mammals

4.3.1: General and Specialized Characters of Prototheria&Metatheria

4.4 Comparative Anatomy of vertebrate Series

4.4.1: Integument
4.4.2: Heart
4.4.3: Aortic Arches
4.4.5: Kidney

B.Sc. (General) Zoology
Semester II Practical

ZOO – G-DSC-202B-P

Diversity of Chordates
Credit – 02 **Lectures – 30** **F.M:25 (20 Ext. + 05 Int.)**

Practical	**Marks Distribution**
1. Dissection / Types of beaks and claws/ Power point presentation of any two animals:	**04**
2. Mounting:	**02**
3. Spotting: Specimen (01), Slides (01)	**2×2=04**
4. Practical record	**05**
5. Viva voce	**05**
	Total=20

Suggested Practicals
Chordate Diversity

1. Protochordate: Balanoglossus, Herdmania
2. **Agnatha:**Peteromyzon and Myxine
3. Pisces:*Scoliodon, Torpedo, Labeorohita, Cirrhinusmrigala*, *Labeobata*, *Hippocampus, Exocoetus, Clariasbatrachus, Anabas, Echeneis, Channa*,
4. Amphibia:,*Ambystoma, Axolotl larva, Salamandra*, *Alytes, Hyla*, *Bufo*(Toad*), Rana* (Frog)
5. Reptiles: Kachuga, *Calotes, Draco, Phrynosoma, Chemaeleon, Typhlops, Najanaja,Bungarus* (Krait), *Vipera*(Chondrabora), *Hydrophis, Crocodylus,* Python.

6. **Aves:** Types of beaks and claws

7. **Mammals:** Spiny Anteater, *Pteropu*s (Megachiroptera), *Manis* (Pangolin), *Funambulus* (squirrel), *Hystrix*(Porcupine), *Cavia* (Guineapig), *Rattusrattus* (rat).

8. Study of Histological Slides: (Frog & Mammal)

V.S. of Skin, T.S. of**:** Stomach, Intestine, Liver, Spleen, Kidney, Lung

9. Dissection: Dissection of Local Bony Fishes: Afferent, Efferent and Nervous system.

10. **Mounting:** Cycloid

11. Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission).

B.Sc. second year
B.Sc Zoology (General)
Semester II

ZOO-G-DSC-203B-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Biochemistry, Physiology & Developmental Biology
04 credits, 60 lectures FM:75 (60 External+15 Internal)

Biochemistry

UNIT-1 Structure and classification of biomolecules
1.1 Protein: Types, Structure, biological Siginificance
1.2 Carbohydrates: Structure, Classification, biological Significance
1.3 Lipids: Structure, Classification, biological Significance
UNIT-2 Metabolism
2.1 Glycolysis
2.2 Kreb's cycle

Physiology

UNIT-1 Blood composition, Blood Coagulation
UNIT-2 Respiration: Transport of gases (O2 & CO2)
UNIT-3 Digestion of food: Protein, carbohydrate and lipid
UNIT-4 Excretion: Nephron & Urine formation
UNIT-5 Histo-Physiology of Thyroid, Adrenal gland and Pancreas
UNIT-6 Histo-Physiology of Testis and Ovary

Development Biology

UNIT-1 Gametogenesis
a. Spermatogenesis
b. Oogenesis
UNIT-2 Fertilization
UNIT-3 Cleavage

UNIT-4 Placenta, types & their Function

B.Sc Zoology (General)
Semester II Practical

ZOO-G-DSC-203B-P

Biochemistry, Physiology and Development Biology
02 Credits, 30 lectures F.M=25 (20 External+05 Internal)

Time: 1andHalfHour	**FM:20**
1. Detection of presence of biomolecules in the sample	**05**
2. Physiology Experiment	**05**
3. Spotting:	**05**
a. Slides of reproductive organ 01	
b. Slides of General organ 01	
c. Endocrine Slide 01	
d. Slides of Development Biology 02	
4. **Practical Records& Viva**	05
	Total=20

Suggested Practical

Biochemistry, Physiology and Development Biology

1. Biochemical test for Protein carbohydrates (Strach& Glucose) & Lipids
2. Determination of Hb%
3. Determination of Bleeding and Clotting time
4. Records of Blood Pressure in Normal & after exercise
5. Study of Permanent Slides : T.S of stomach, intestine, kidney, lungs, liver
6. Study of Slides of Reproductive organ: Testis, Ovary & Uterus
7. Study of Endocrine Glands Slides: Thyroid, Adrenal & Pancreas
8. Study of Permanent Slides of Chick Embryo (WM)-18 hrs, 24 hrs, 36 hrs ,48 hrs& 72 hrs

B.Sc. second year
Semester III

ZOO-G-DSC-301C-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Biochemistry, Physiology & Developmental Biology
04 credits, 60 lectures FM:75 (60 External+15 Internal)

UNIT-1 Structure and classification of biomolecules
1.1 Protein: Types, Structure, biological Siginificance
1.2 Carbohydrates: Structure, Classification, biological Significance
1.3 Lipids: Structure, Classification, biological Significance
UNIT-2 Metabolism
2.1 Glycolysis
2.2 Kreb's cycle

Physiology

UNIT-1 Blood composition, Blood Coagulation
UNIT-2 Respiration: Transport of gases (O2 & CO2)
UNIT-3 Digestion of food: Protein, carbohydrate and lipid
UNIT-4 Excretion: Nephron & Urine formation
UNIT-5 Histo-Physiology of Thyroid, Adrenal gland and Pancreas
UNIT-6 Histo-Physiology of Testis and Ovary

Development Biology

UNIT-1 Gametogenesis
a. Spermatogenesis
b. Oogenesis
UNIT-2 Fertilization
UNIT-3 Cleavage
UNIT-4 Placenta, types& their Function

Practical –P-3

ZOO-G-DSC-301C-P

(02 Credits, 30 lectures)
Biochemistry, Physiology and Development Biology

Time: 1andHalfHour	**FM:20**
5. Detection of presence of biomolecules in the sample	**05**
6. Physiology Experiment	**05**
7. Spotting:	**05**
e. Slides of reproductive organs 01	
f. Slides of General tissue 01	
g. Endocrine Slides 01	
h. Slides of Development Biology 02	
8. **Practical Records& Viva**	05
	Total=20

Suggested Practical

Biochemistry, Physiology and Development Biology

1. Biochemical test for Protein carbohydrates (Strach& Glucose) & Lipids
2. Determination of Hb%
3. Determination of Bleeding and Clotting time
4. Records of Blood Pressure in Normal & after exercise
5. Study of Permanent Slides : T.S of stomach, intestine, kidney, lungs, liver
6. Study of Slides of Reproductive organ: Testis, Ovary & Uterus
7. Study of Endocrine Glands Slides: Thyroid, Adrenal & Pancreas
8. Study of Permanent Slides of Chick Embryo (WM)-18 hrs, 24 hrs, 36 hrs ,48hrs& 72 hrs.

B.Sc. (General) Zoology
Semester III

ZOO-G-DSC-302C-T

- In all nine questions are to be set of equal values and five questions are to be answered of which question no. 1 will be compulsory
- Questions will be grouped into two - Group A and Group B.
- Group a will comprise question no. 1, which will consist of two parts A & B. Part A will be MCQ type, covering entire syllabus and carry one mark each(1x6=6) and part B will comprise short answer, three mark each(3x2=6). There will be no option in the Q. No. 1.
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from this group. Each carries 12 marks.
- The question no. 9 will be of short notes type each carrying six marks (6x2=12) in which only two should be answered out of four options.

BIOCHEMISTRY & PHSIOLOGY
Credit – 04 **Lectures – 60** **F.M: 75 (60 Ext. + 15 Int.)**

UNIT 1. Biomolecules

1.1 Protein

1.1.1: Types of Protein
1.1.2: Structure, Organization and Conformation of Primary, Secondary, Tertiary & Quaternary Proteins
1.1.3: Biological Significance

1.2 Carbohydrates

1.2.1: Structure, Classification, Biological Significance of Monosacccharides, Disaccharides and Polysaccharides.

1.3 Lipids

1.3.1: Fatty Acids
1.3.2: Saturated and Unsaturated Fatty Acids
1.3.3: Essential and Non- essential Fatty Acids
1.3.4: Structure, Classification and Biological Significance (Simple, Compound and Derived Lipids)

UNIT 2. Diet & Digestion

2.1 Concept of Balanced Diet
2.2 Physiology of Digestion and Absorption

2.2.1: Digestion of Carbohydrate, Fats and Proteins in Gastro-Intestinal Tract

UNIT 3. Physiology of Circulation and Respiration

3.1 Composition and Function of Blood
3.2. Blood Clotting Mechanism
3.3. Mechanism and Regulation of Breathing
3.4. Transport of gases

3.4.1: Transport of Oxygen
3.4.2: Oxygen Dissociation Curve
3.4.3: Bohr's Effect

3.4.4: Transport of Carbon Dioxide
3.4.5: Carbon Dioxide Dissociation Curve

UNIT 4. Renal & Reproductive Physiology

4.1 Physiologic Anatomy of Kidney
4.2 Physiology of Urine Formation
4.3 Histo-Physiology of Testis
4.4 Histo-Physiology of Ovary

B.Sc. (General) Zoology
Semester III Practical

ZOO-G-DSC-302C-P
BIOCHEMISTRY & MAMMALIAN PHYSIOLOGY
Credit – 02 Lectures – 30 F.M: 25 (20 Ext. + 05 Int.)Practical

	Marks Distribution
1. Physiological Experiment:	**04**
2. Biochemistry practical:	**04**
3. Spotting:	
a. Slides of general organs (01)	**1×2=02**
4. Practical record	**05**
5. Viva voce	**05**
	Total=20

Suggested Practicals

Mammalian Physiology

1. Preparation of Haemin Crystal
2. RBC count by using haemocytometer
3. Estimation of Haemoglobin using Sahil's method
4. Record of blood pressure by Sphygnomanometer
5. Determination of Bleeding time in human
6. Determination of Coagulation time in human
7. Study of permanent slide of section of organs:
   Stomach, lung, liver, kidney, intestine

Biochemistry

1. Detection of biomolecules in the unknown sample-
   a. Glucose
   b. Amino acids
   c. Proteins
   d. Lipids
2. Quantitative estimation of glucose
3. Action of salivary amylase under optimum condition.
4. Separation of Chlorophyll by Chromatography.

B.Sc Zoology (General)
Semester III

ZOO-G-DSC-303C-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Cell Biology, Genetics and Endocrinology
04 credits, 60 lectures FM:75 (60 External+15 Internal)

UNIT-1 Cell Structure & Functions
1.5 Study of structure & functions of Plasma membrane
1.6 Study of Cell Organelle- Mitochondia, E.R, Ribosome, Lysosome
1.7 Types and structure of a typical chromosome-
b. Ultrastructure of chromatin fiber-Nucleosome, Polytene and lampbrush chromosome
1.8 Cell Division: Mitosis, Meiosis their significance.
UNIT-2 Principle of Genetics
2.1 Mendels Law of Inheritance
2.2 Linkage & Crossing Over
2.3 DNA: Structure & Function
UNIT-3 Hormones, Properties and Classification of Hormones

UNIT 4. Endocrine Glands
4.1 Structure and Histo-Physiology of Pituitary
4.2 Structure and Histo-Physiology of Thyroid
4.3 Structure and Histo-Physiology of Adrenal
4.4 Structure and Histo-Physiology of Endocrine Pancreas

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B.Sc Zoology (General)
Semester III Practical

ZOO-G-DSC-303C-P

Cell Biology, Genetics & Evolution
02 Credits **30 Lectures** **F.M.25 (20 External +05 Internal)**

Time: 1 and half Hr **FM:20**

4. **Pedigree Analysis (one)** **04**
5. **Slide Preparation** **02**
6. **Spotting**
   d. **Endocrine slides (02)** **2×2=04**
7. **Practical Record** **05**
8. **Viva** **05**

Total=20

List of Suggested Practical's

7. Study of permanent slides of cell division (Mitosis/Meiosis)
8. Preparation of mitotic slides from onion root tips.
9. Study of Polytene and lampbrush chromosome through photographs
10. Study of sex linked characters: Hemophilia and color blindness through Pedigree Analysis
11. Study of homologous and analogous organs
12. Study of some fossils/extinct models: Trilobites, Archaeopteryx
13. Endocrine slides: testis, ovary, thyroid, adrenal and pancreas

B.Sc. ZOOLOGY (General)
Semester IV

ZOO-G-DSC-401D-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
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- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Ecology & Economic Zoology

04 credits, 60 lectures F.M=75(60 External+15 Internals)

Ecology

1. **General Concept**
   1.2 Ecosystem
   1.3 Food Chain & Food web & Ecological Pyramids
   1.4 Energy flow
   1.5 Bio-Geochemical Cycle: Nitrogen & Carbon
2. **Population and Communities**
   2.1 Ecological Succession

3. Environmental Pollution

3.1 Pollution Sources & Impacts of Environmental Pollution-Air& Water

8.2 Green House Gases and Effects

9. **Natural Resources and Conservation**
   8.1 Renewable & Non-renewable Energy Source

Economic Zoology

UNIT-1 Apiculture: Types, Caste of honey bee, disease, Economic importance
UNIT-2 Sericulture: Types, disease, Economic importance
UNIT-3 Lac culture: Species, Methods, Economic importance

B.Sc. Zoology (General)
Semester-IV

ZOO--G-DSC-401D-P

Ecology & Economic Zoology
02 Credits **30 lectures** **FM - 25(20 External +05 Internal)**

Time-1 and half hr

1. Ecology Practical	**05**
2. Spotting	
a. Slides of Economic zoology	**2×2=4**
b. Specimens of Economic Zoology	**2×3=6**
3. Practical Records & Viva	**05**
	Total=20

List of Suggested Practical's

Ecology

1. Study of aquatic animals, phytoplankton and zooplankton
2. Determination of pH in soil and water
3. Estimation of free carbon di oxide
4. Model of food chain

Economic Zoology

1. Slides of – Mouth part of culex, anopheles, Plasmodium (Signet ring)
2. Common paddy and sugar cane pest,
3. Life cycle of Honey bee,
4. Cocoon of silkworm
5. Lack infestation on stick.

B.Sc. (General) Zoology
Semester IV

ZOO-G-DSC-402D-T

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- The question no. 9 will be of short notes type each carrying six marks (6x2=12) in which only two should be answered out of four options.

GENETICS, EVOLUTION &ANIMAL BEHAVIOUR
Credit – 4 **Lectures – 60** **F.M: 75 (60 Ext. + 15 Int.)**

UNIT 1. Classical Genetics: Mendelism
1.1 Mendel's Law of Inheritance
1.2.1: Law of segregation
1.2.2: Law of Independent Assortment
UNIT 2. Extensions of Mendelism
2.1 Complete Dominance, Incomplete Dominance & Co- dominance
2.2 Lethal Alleles
2.3 Multiple Alleles
2.6 Linkage and Crossing Over
UNIT 3. Mutation
3.1 Concept of Spontaneous and Induced Mutation
3.2 Structure and Numerical alterations of Chromosomes and Related Disorders: Down's Syndrome, Klinefelter syndrome.
UNIT-4 Evolution

4.1 Theory of organic evolution; Lamarckism's theory of inheritance of acquired characters Criticism and Neo-Lamarckism
4.2 Darwin's theory of natural selection, Criticism and Neo-Darwinism

UNIT 4. Introduction to Ethology
4.1 Origin & Study of Animal Behaviour
UNIT 5. Concept & Pattern of Behaviour
5.1 Types of Behaviour
5.1.1: Innate/ Instinct Behaviour
5.1.2: Acquired/ Learned Behaviour
UNIT 6. Social Organization & Communication

6.1 Social Organization in Honey Bee and Termites

B.Sc. (General) Zoology
Semester IV Practical
ZOO-G-DSC-402D-P

GENETICS AND ANIMAL BEHAVIOUR

Credit – 2 **Lectures – 30** **F.M: 25 (20 Ext. + 05 Int.)**

Practical **Marks Distribution**

1. **Statistical Verification Of Law Of Segregation:** **04**
2. **Comment On Bee Hive/Termite Mound Specimen Showing Behavior** **04**
3. **Experiment on Geotaxis/Phototaxis** **02**
4. **Sessional Record** **05**
5. **Viva Voce** **05**

Total=20

Suggested Practical

Genetics

1. Experiment Verification of Principles of Segregation and Independent Assortment Using Colored Beads and Chi-Square Test.
2. Preparation of Linkage Maps Based on this Data From Drosophila/Maize.
3. Study of Pattern of Inheritance in Human Population of the Traits Rolling Of Tounge And Mid Digital Hair, Hypertrichosis, Widow's Peak

Animal Behaviour

1. Study Of Geo-Taxis, Photo-Taxis, Hygro-Taxis In Animals
2. Locomotory Behavior of Dipteran Larvae (Housefly/Blowfly/Fruitfly)
3. Specimen Showing Behaviour –Prey Mantis, *Hippocampus*, *Alytes*, Migratory Fish
4. Study of Bee Hive and Mound of Termites.

B.Sc. (Hons.) Zoology
Semester IV

ZOO-G-DSC-403D-T

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- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from this group. Each carries 12 marks.
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MOLECULAR BIOLOGY, BIOTECHNOLOGY & MEDICAL ZOOLOGY
Credit – 4 Lectures – 60 F.M: 75 (60 Ext. + 15 Int.)

UNIT 1. DNA Replication and Gene Expression

1.1 DNA Replication
- 1.1.1: Central Dogma
- 1.1.2: Replication of DNA in Prokaryotes
- 1.1.3: Inhibitors of DNA Replication

1.2 Gene Expression
- 1.2.1: Mechanism of Transcription in Prokaryotes
- 1.2.2: Concept of Genetic Code
- 1.2.3: Mechanism of Translation in Prokaryotes

UNIT 2.

2.1 Concept of Operons (Positive and Negative: Inducible & Repressible)

2.2 Concept of Lac Operon

UNIT 3. DNA Damage and Repair

3.1 DNA Damage
- 3.1.1: Sequences of DNA Damage
- 3.1.2: Types of DNA Damage

3.2 DNA Repair
- 3.2.1: Base Excision Rwepair
- 3.2.2: Nucleotide Excision Repair

UNIT 4. Biotechnology

4.1 Transgenic Animals
- 4.1.1: Concept of Transgenes
- 4.1.2: Methods of Inducing Transgene Animals (Mice)

UNIT 5. Protozoan & Helminthes parasites: Life Cycle, Pathogenicity, prophylaxis and Treatment

5.1 Entamoebahistolytica

5.2 Leishmaniadonovani

5.3 Ascarislumbricoids

UNIT 6. Arthropods as Vector of Human Disease

6.1 Mode of Transmission of Disease by Arthropod

6.2 Bionomic & Disease Transmitted By

6.2.2: Anopheles (Female): Malaria

6.2.3: Aedes: Dengue

UNIT 7. Human disease caused by viruses & bacteria: Causative agents & pathogenicity

7.1 Diseases caused by Viruses

7.1.1: Air-Borne Viral Disease: COVID

B.Sc. (General) Zoology
Semester Practical

ZOO – G-DSC-403D-P

Molecular Biology & Medical Zoology
Credit – 02 Lectures – 30 F.M: 25 (20 Ext. + 05 Int.)

Practical	**Marks Distribution**
1. Comments on transgenic animals/cloned animals Photographs / maize specimens/photographs of Transposition (2)	**2×2=04**
2. Spotting on specimens & slides of Ascaris/ Taenia /mosquito Parasite Protozoa: 01 specimens 2 slides	**2×3=06**
3. Sessional Record	**05**
4. Viva Voce	**05**
	Total=20

Suggested Practicals

Molecular biology & Biotechnology

1. Demonstration of DNA separation on Gel
2. Use of micropipette
3. Protein estimation by Colorimeter
4. Study of transposition through Maize specimens/Photographs
5. Study of cloned animals through photographs
6. Study of transgenic animals through photographs

Medical Zoology

1. Study of pathogenic protozoa by photographs/Slides (*Entamoebahistolytica*, *Leishmaniadonovani*, *Trypanosoma*)
2. Museum specimens of helminthes parasites (*Taenia*, *Ascaris*)
3. Mosquito mouth parts (Anopheles, Culex)
4. Study of Epidemic typhus ticks by photographs

B.Sc. (General) Zoology
Third –Year- Semester-V

ZOO-H-DSE-501A-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

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Immunology & Microbiology
04 Credits **60 lectures** **F.M: 75 (60 Ext. + 15 Int.)**

Immunology

1. Introduction to immunity
   1.1 Innate Immunity
   1.2 Humoural Immunity
2. Cells & organs of Immune System
   2.1 Types of Immune cells
   2.2 Primary & Secondary Lymphoid
3. Antigen and Antibody
   3.1. Antigen
   3.2. Antibody: Structure, Types & Function
4. ELISA

Microbiology

1. Structure of Bacteria & Animal Virus (HIV)
2. Vaccine

B.Sc. Zoology (General)
Semester V Practical

ZOO-G-DSE-501A-P

Immunology and Microbiology
02 credits, 30 lectures **FM – 25 (20 External + 05 Internals)**

Practical	**Marks Distribution**
1. Preparation of blood film to show immune cells	**05**
2. Blood Grouping	**05**
3. Spotting	
a. Slide of lymphoid organs (03)	**2×3=06**
4. Gram staining bacteria	**04**
	Total= 20

List of suggested Practical

1. Study of immune cells in blood film
2. Study of different types of Antibody through model/photographs
3. Blood group to demonstrate antigen-Antibody interaction
4. Study of Permanent slides /Photographs of
   a. Bone b. Thymus c. Spleen
5. Grain staining Bacteria.

B.Sc. Zoology (General)
Semester V

ZOO-G-DSE-502A-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

WILD LIFE CONSERVATION AND MANAGEMENT
Credit-04 Lectures-60 F.M=75 (60 External+ 15 Internals)

UNIT-1: Wild life –Depletion & conservation; Importance of conservation.

UNIT-2: Faecal analysis of ungulates and carnivores; Faecal sample, slide preparation, Hair identification, Pug marks and census method.

UNIT-3: National Organization involved in wild life conservation; wild life Legislation-Wild protection act 1972, its amendments and implementation, Eco-tourism/ Wild life tourism in forests.

UNIT-3: Protected areas- National parks and sanctuaries, community reserve; important features of protected areas in India; Project Tiger-Tiger reserves in India; Red data book, IUCN, WWF.

B.Sc. Zoology (General)
Practical

ZOO-G-DSE-502A-P

WILD LIFE CONSERVATION AND MANAGEMENT
Credit-02 Lectures-30 F.M=25 (20 External + 05 Internal)

Practical **F.M=20**

1. **Identification of wild fauna on the basis of pug marks/pellet/nest 05**
2. **Comment on the photographs of endangered species 05**
3. **Seasonal Records 05**
4. **Viva voce 05**

Suggested Practical

1. Identification of mammalian fauna, avian fauna in nearby national/Zoological park/sanctuary.
2. Familiarization and study of animal evidences in the field, identification of animals through pug marks, hoof marks, pellet groups, nest, antlers etc.
3. Study of endangered species through photographs.
4. Visits to National park/zoological park/ protected areas.

B.Sc. Zoology (General)
Semester V

ZOO-G-DSE-503A-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
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- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Reproductive Biology
Credit-04 **Lectures-60** **F.M=75 (60 External + 15 Internal)**

UNIT-1. Reproductive Endocrinology

1.1. Hypothalamo-Hypophyseal-Gonadal Axis
1.2. Regulation of Gonadotropin Secretion in Human (Male and Female)
1.3. Reproductive System:
1.3.1: Development and Differentiation of Gonads

UNIT-2. Functional Anatomy of Male Reproduction

2.1. Histo-Architecture of Testis in Human
2.2. Spermatogenesis and its Hormonal Regulation

UNIT-3. Functional Anatomy of Female Reproduction

3.1. Histo-Architecture of Ovary in Human
3.2. Oogenesis and its Hormonal Regulation
3.3. Reproductive cycles (Human) and their Regulation
3.4. Fertilization

UNIT-4. Reproductive Health

4.1 Infertility in Male and Female: Causes, Diagnosis and Management.

B.Sc. Zoology (General)
Semester V Practical

ZOO-G-DSE-503A-P

Practical **F.M=25 (20 External+05 Internal)**

1. **TissueFixation, Embedding in Paraffin and Slide Preparation/H-E staining of Histological slides**	**05**
2. **Study of Permanent Slides/Photographs of Endocrine glands (02) 2.5×2=**	**05**
3. **Sessional Records**	**05**
4. **Viva voce**	**05**
	Total=20

Suggested Practicals

1. Study of Animal House: Set Up and Maintenance of Animal house, Breeding Techniques, Care of Normal and Experimental Animals (Only Demonstration Through Chart).
2. TissueFixation, Embedding in Praffin, Microtomy and Slide Preparation of any Endocrine glands.
3. H-E Staining of Histological Slides.
4. Examination of Histological sections from Photomicrographs/Permanent slides of Rat/Human: Testis, Epididymis and Accessory Glands of Male Reproductive Systems; Ovary, Fallopian tube, Uterus(Proliferative and Secretory stages).

B.Sc. Zoology (General)
Semester VI

ZOO-G-DSE-601B-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

Biostatistics

04 Credits **60 lectures** **F.M=75 (60 External + 15 Internal)**

1. Sampling Methods
2. Data Primary & Secondary data, Frequency Distribution
3. Measurement of Central tendency: Mean, Media & Mode
4. Measurement of Deviation: Standard Deviation & Standard Error of mean
5. Test of Significance:‘t’ test

Practical

ZOO-G-DSE-601B-P
Biostatistics
02 credits **30 lectures** **FM: 25 (Internal-20+ External -05)**

Time: 1 & Half Hours

1. **Graphical Representation of Data Provided** **05**
2. **Calculation of mean/median/ mode/standard deviation /'t' test 10**
3. **Practical Record and Viva Voce** **05**

Total=20

List of Suggested Practicals

Biostatistics

1. Calculation of arithmetic mean of data provided
2. Graphical representation of Data provided
3. Calculation of Mean, Median & Mode of data provided
4. Calculation of standard deviation and Standard error
5. Calculation of 't' test

B.Sc. Zoology (General)
Semester VI

ZOO-G-DSE-602B-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four options

PEST & PEST MANAGEMENT
Credit-04 Lectures-60 F.M=75 (60 External+ 15 Internals)

UNIT-1: Fundamentals of Pest management

1.1 Pest: Definition and types of pest

UNIT-2: Practical approach to pest management

2.1 Integrated pest management: Mechanical, biological, chemical, genetic control; common pesticides and insecticides, Nomenclature, Mode of action, tools & techniques for pesticide application

UNIT-3: Study of Pest in laboratory and field

3.1 Biology, damage and management of Pest of Paddy and Sugar cane

B.Sc. Zoology (General)
Semester VI Practical

ZOO-G-DSE-602B-P
F.M=25 (20 External+05 Internal)

1. Comments on the common pest (02)	**05**
2. Comments on the equipment used in the wild life study/pest management	**05**
3. Sessional Records	**05**
4. Viva voce	**05**

Total=20

Suggested Practicals

1. Study of common pest (sugarcane, paddy)
2. Collection , preservation and slide preparation of pest
3. Trip to ICAR governing field of your locality /FCI/agricultural field for study of pest
4. Study of instrument used in pest management (IPM)

B.Sc. Zoology (General)
Semester VI

ZOO-G-DSC-603B-T

- In all nine questions are to set of equal values and five questions are to be answered of which question no 1 will be compulsory
- Questions will be grouped into two-Group A and Group-B.
- Group A will comprise questions no.1 which will consist of two parts A & B. Part A will be MCQs type, covering entire syllabus and carry one mark each (1×6=6) and part B will comprise short answer, three mark each (3×2=6).
- Rests eight questions will be of long type set from the whole syllabus in Group B. Examinees are required to answer any four from the group.
- The question no. 9 will be of short notes type each carrying six marks (6×2=12) in which only two should be answered out of four option

Fisheries and Aquaculture
Credit-4 **Lectures-60** **F.M-75 (60 External+15 Internal)**

UNIT-1 Introduction and Classification
1.1 General Description of Fish
1.2 Classfification of Fishes (up to classes)
UNIT-2: Morphology and Physiology
2.1. Types of Fins and their modification
2.2. Locomotion in Fish.
2.3. Types of Scales.
2.4. Gills and Gas Exchange
2.5. Swim Bladder: Types and Role in Respiration, Buoyancy
UNIT-3: Fisheries
3.1. InlandFisheries
3.2. Marine Fisheries
3.3. Fishing Crafts and Gears
UNIT-4: Aquaculture
4.1. Extensive, Semi-Intensive and Intensive Culture of Fish.
4.2. Pen and Cage culture.
4.3. Polyculture

B.SC Zoology (General)
Semester VI
Practical

ZOO-G-DSE-603B-P

Credits 02 **Lectures 30** **F.M=25 (20 External+05 Internal)**

Practical

1. Identification of Fishes /Types of scales	**(02)**	**2.5×2**	**05**
2. Comments on Air breathing Fishes/ Crafts and Gears	**(02)**	**2.5×2**	**05**
3. Sessional Records			**05**
4. Viva voce			**05**

Total=20

Suggested Practicals

1. Identication of *Petromyzon, Exocoetus, Hippocampus, Labeo, Cirrhinusmrigala, Anabus*
2. Study of different types of scales (through permanent slides/photographs).
3. Study of Crafts and Gears used in Fisheries (Photographs)
4. Study of Air breathing organs in *Channa, Clarias, Heteropneustes* and *Anabas.*
5. Project Report on a visit Fish Farm/Pisiculture.