

SAURASHTRA UNIVERSITY

RAJKOT



Accredited Grade 'A' by NAAC

(CGPA 3.05)

FACULTY OF SCIENCE

[Three Years (6 Semesters) Full Time Course]

ZOOLOGY SYLLABUS

According to Choice Based Credit System

Effective From June- 2021

Saurashtra University
University Campus, Rajkot – 360 005.
Gujarat, India.

-Website: www.saurashtrauniversity.edu

SAURASHTRA UNIVERSITY



Choice Based Credit System (CBCS) Syllabus For

Semester V & VI —ZOOLOGY

Semester – V

Paper No.-501: Functional Anatomy of Non-chordates

**Paper No.-502: Fisheries biology, Animal Husbandry, Bioinstrumentation,
Toxicology, Biostatistics**

**Paper No.-503: Biochemistry I, Biochemistry II Cytology, Genetics,
Fundamental Processes**

Semester – VI

Paper No.-601: Functional Anatomy of Chordates and comparative study

**Paper No.-602: Cardiovascular system, Respiration and Muscular System,
Endocrinology and Reproduction, Immunology and Sense
Organ and Histology**

**Paper No. - 603: Reproductive physiology and Embryology, Developmental
biology, Wild life, Ecology & Environmental pollution, Evolution**

INFORCE FROM JUNE – 2021

FORWARD

Renewing and updating of the Curriculum is the prime important criteria in the University education system.

Syllabus provides an educational guide line and demarks the horizon of a subject. Syllabus of different Theory and Practical papers should have subjective harmony and gradual relationship within periphery of a subject.

Formulation of Curriculum for a particular subject requires the following criteria.

- (A) Background of previous Curriculum.
- (B) Relationship with other related subjects.
- (C) Resources of Educational needs at regional level as well as national level.
- (D) Financial and Statuary provisions of the State government.

All the above criteria are taken into consideration in formulation of this Curriculum.

This Curriculum is the result of prolonged discussions among the experienced teacher in this subject because after all, the college teachers are the real catalysts for implementation of this Syllabus.

The proposed Syllabus after required formalities will be implemented in the third year B.Sc.

Valuable guidelines and all facilities in this curriculum are provided by the authorities of the Saurashtra University, Rajkot.

DR. A.N UPADHAYAYA

Chairman,
Board of Studies, Zoology,
Zoology,
Saurashtra University,
Rajkot – 360 005.

DR. S.K TERAIYA

Other Than Chairman,
Board of Studies,
Saurashtra University,
Rajkot – 360 005.

SAURASHTRA UNIVERSITY, RAJKOT

Revised syllabus of B.Sc. Semester V and VI Zoology as per UG guidelines Effective from June 2021

This curriculum consists of six theory papers and six practicals. Syllabus has been divided in to two semesters (i.e. semester – V and VI). Students have to study three papers in each semester and three practicals based on theory papers. The course is to be completed by assigning six periods for each theory and six periods for each practical per week. Practical periods are inclusive to field study.

Paper No.-501: Functional Anatomy of Non-chordates

**Paper No.-502: Fisheries biology, Animal Husbandry, Bioinstrumentation,
Toxicology, Biostatistics**

**Paper No.-503: Biochemistry I, Biochemistry II Cytology, Genetics,
Fundamental Processes**

Paper No.-601: Functional Anatomy of Chordates and comparative study

**Paper No.-602: Cardiovascular system, Respiration and Muscular System,
Endocrinology and Reproduction, Immunology and Sense
Organ and Histology**

**Paper No. - 603: Reproductive physiology and Embryology, Developmental
biology, Wild life, Ecology & Environmental pollution, Evolution**

Pattern of Examination:

There should be two internal exams per semester. An average 10 marks should be given for internal exams and that marks will be included in final aggregate results of the semester. Besides internal examination there are two assignments of the subjects to be submitted by the students. 10 marks for assignments, 10 marks for test, 5 mark for attendance and 5 marks for quiz will be added to the final results of the semester. Total 30 marks are internally assessed and 70 marks for external (University Exams) exams, per paper. A student's performance in every practical session is assessed and marks for a maximum of 15 is given. External practical evaluation will carry 35 marks, so total 50 marks for each practical per paper examination will be counted. The pattern of semester exam will be as follows.

Sr. No.	Name Of Programme	B.Sc. ZOOLOGY Semester-5		
		501	502	503
1	Theory credit	4	4	4
2	Practical credit	3	3	3
3	Project credit	3		
4	Total credit	24		
5	External marks of theory	70	70	70
6	Internal marks of theory	30	30	30
7	Total marks of theory	100	100	100
8	External marks of Practical	35	35	35
9	Internal marks of theory	15	15	15
10	Total marks of practical	50	50	50
11	Grand total	150	150	150
12	External examination time duration	2.30 hrs	2.30 hrs	2.30 hrs

Sr. No.	Name Of Programme	B.Sc. ZOOLOGY Semester-6		
		601	602	603
1	Theory credit	4	4	4
2	Practical credit	3	3	3
3	Project credit	3		
4	Total credit	24		
5	External marks of theory	70	70	70
6	Internal marks of theory	30	30	30
7	Total marks of theory	100	100	100
8	External marks of Practical	35	35	35
9	Internal marks of theory	15	15	15
10	Total marks of practical	50	50	50
11	Grand total	150	150	150
12	External examination time duration	2.30 hrs	2.30 hrs	2.30 hrs

-: Project Work:-

- The project will be assigned individual or in group (maximum four students are allowed).
- There will be one lecture per week to guide and motivate for each group of students.
- Topic of the project may be selected based on the following:

Ecology, pollution biodiversity, entomology, animal science, animal behavior, toxicology, environmental science, human physiology and any topic of syllabus

Every project must be submitted with proper documentation about the concept.

- **During the semester students will be**
 1. Introduced and assigned title of the project in fifth semester
 1. Teams will be formed for the same.
 2. Each group or individual will study, search reference, collect data and work-out details for their topic of project-work in fifth semester.
 3. Students will finalize, document, submit and get the project work certified in their names in sixth semester.
 4. The project work must be submitted by the student before 15 days of the final exam
 5. Only on the submission of project dissertation the student will be issued hall ticket for the end semester theory and practical examination.
 6. The Project may be typed be limited to 30 to 50 pages of A4 size.
 7. Project work shall be evaluated by an external and one internal examiner which will be followed by presentation of the work and viva-voce.
 8. Students will be required to undergo verification, evaluation and viva of the project-work they have done.
 9. Certified documentation of the project-work done by each group is mandatory. The certified documentation should be produced while appearing for viva and evaluation of project during final examination of sixth semester.
- The Evaluation of the project work will be done at the end of the sixth semester. For the Evaluation of the project work there shall be three hours duration at the end of the sixth semester. There shall be batch of 15 students for project and viva.

Declaration

I have read all the rules outlined above and I have followed them.

Student Signature: _____ Student Name _____

SAURASHTRA UNIVERSITY, RAJKOT

B.Sc. Semester-VI
Zoology
Practical exam- Project
Marking scheme of project Total marks: 100

1. Selection of the topic and project title	10
2. Introduction	10
3. Review of literature	05
4. Aims and objective	10
5. Methodology	10
6. Result and discussion	20
7. Conclusion	10
8. References	05
9. Viva	20

**SKELETON OF QUESTION PAPER FOR
THEORY PAPERS
(EXTERNAL EXAMS)**

**SAURASHTRA UNIVERSITY - RAJKOT
THEORY EXAMINATION
SEMESTER – V and VI
ZOOLOGY**

(Based on Paper – Z-501 to 603)

Time: 2½ Hours

Total Marks: 70

Instructions:

1. Illustrate your answer with neat and labelled diagram. 2. Figure to the right side indicates full marks of questions.

QUESTION-1 (THIS QUESTION IS TAKEN FROM UNIT-1)

QUESTION-2 (THIS QUESTION IS TAKEN FROM UNIT-2)

QUESTION-3 (THIS QUESTION IS TAKEN FROM UNIT-3)

QUESTION-4 (THIS QUESTION IS TAKEN FROM UNIT-4)

**QUESTION-5 (THIS QUESTION IS TAKEN FROM UNIT-5)-
ANY TYPE OF MCQs IS NOT INCLUDED IN THIS PAPER
STYLE.**

**- EACH QUESTION CARRIES EQUAL MARKS – 14. -
THERE ARE 5 QUESTIONS CONTAINING SUBQUESTIONS
(A), (B), (C), (D).**

B.Sc. Semester V

Zoology Syllabus

Paper-Z-501

Functional Anatomy of Non-chordates

Unit-1 Systematic

Salient feature and outline classification up to classes in non-chordates with examples.

Unit-2 Forms and Functions in Animals

2.1 General structures and morphology with functional anatomy of following type.

Type animal with classification up to order

[A] Phylum : Arthropoda - Type study- Scorpion

[1] External features [2] Digestive system

[3] Nervous system [4] Reproductive system (Male and Female)

[5] Book lungs [6] Pecten [7] All appendages

[B] Phylum : Mollusca - Type study- Sepia

[1] External features [2] Digestive system

[3] Nervous System [4] Ink-Gland

Unit-3 Invertebrate Part I (Protozoa to coelenterates)

3.1 Protozoa: Nutrition, locomotion, reproduction

General account of Protozoa and human diseases :

(i) Leshmania - Leshmaniasis

(ii) Giardia- Diarrhoea

(iii) Plasmodium - Malaria

3.2 Porifera: Skeleton, canal system, Reproduction and sponge industry

3.3 Coelenterata: Coral, coral reefs and polymorphism

Unit -4 Invertebrate Part II (Platyhelminthes to Arthropoda)

4.1 Platyhelminthes: Parasitic adaptation with reference to Fasciola

4.2 Aschelminthes: Parasites nematodes of man with reference to diagnostic characters mode of infection and disease caused (Trichinella Spiralis, Ancylostoma (Hook worm), Ascaris

4.3 Annelida: Metamerism and its significance

4.4 Arthropoda: Larval forms of Crustacea (Nauplius, Meta nauplius, Zoea, Mysis, Megalopa), Metamorphosis in insects and Zoological importance of Peripatus.

Unit-5 Invertebrate Part III (Mollusca to Hemichordate)

5.1 Mollusca: Foot in Mollusca, Torsion and Detorsion.

5.2 Echinodermata: Larval forms, water vascular system

5.3 Hemichordata: Affinities (Balanoglossus), Tornaria larvae

B.Sc. Semester-V
Zoology Practical Syllabus
Practical -1
Based on Paper-Z-501

Unit-1 Identification and classification up to order

Protozoa: Euglena, Trichomonas, Entamoeba, Giardia, Actinospherium, Leishmania.

Porifera: Sycon, Pheronema, Spongilla.

Coelentrata: Valella, Tubularia, Aurelia, Corallium (Red Coral), Pennatula (Sea Pen),
Fungia (Mushroom coral), Leucemaria, Haliclystus

Platyhelminthes: Liver fluke

Aschelminthes: Trichinella spiralis, Ancylostoma, oxyuris

Annelida: Chaetopterus, Tubifex, Bonelia, Acanthobdella.

Arthropoda: Apus, Balanus, Hermit Crab, Lepisma, Pediculus, Forficula, Nepa,
Musca domestica, Wasp, Butterfly.

Mollusca: Murex, Aplysia, Doris, Teredo, Eolis, Pinctada vulgaris.

Echinodermata: Anthenea, Luidia, Echinocardium

Hemichordata: Balanoglossus

Unit 2: Dissection and Temporary mountings.

Scorpion

[1] External features [2] Digestive system

[3] Nervous system [4] Reproductive system (Male and Female)

Sepia:

[1] External features [2] Digestive system

[3] Nervous System

Mounting:

Part I Scorpion [1] Book lungs [2] Pecten [3] All appendages

Part II Sepia [1] Ink-Gland

Part III Star fish [1] Tube feet

Unit 3: Preparation from preservative material

Protozoa: Vorticella.

Porifera: Sponge Spicules and gemmules.

Coelenterata : Hydra with bud.

Unit 4 A study of permanent slides and important specimens.

Part 1 Conjugation in paramecium, Obelia hydranth in L.S., Obeliagonagium, T.S. of Leech.

Part 2 (a) Naupleus larvae, Metanapleus larvae, Zoea larvae, Mysis larvae, Megalopa larvae,
(b) Life cycle of butter fly (egg, larva, pupa and adult).

Unit 5 A study of permanent slides and important specimens.

Part 3 (a) Bipinnaria larvae, Ophiopluteus larvae, Echinopluteus larvae and water vascular
system of antedon

(b) T.S. of Balanoglossus through proboscis, T.S. through oesophageal region.

PRACTICAL INDEX

Practical no 1 Based on PaperZ-501

- (1) Classification of Protozoa to Coelenterates
- (2) Classification of Platyhelminthes to Annelida
- (3) Classification of Arthropod& Mollusca
- (4) Classification of Echinodermata & Hemichordata
- (5) To study external features and digestive system of scorpion
- (6) To study nervous system and reproductive system of scorpion
- (7) To study mounting of pecten, of book-lung and all appendages of scorpion
- (8) To study external feature and water vascular system of star-fish
- (9) To study external features and digestive system of sepia
- (10) To study nervous system of sepia
- (11) To study mounting of Ink-Gland of sepia and Tube feet of Star fish
- (12) Preparation from preservative material- Protozoa to coelenterate
- (13) A study of permanent slide and important specimen-Part I
- (14) A study of permanent slide and important specimen-Part II
- (15) A study of permanent slide and important specimen-Part III

A list of references books of Paper-501

- (1)The invertebrate vol.1&2 --Hyman, L.H.(Mc Graw Hill)
- (2)Invertebrate zoology -- Barbes, R.D. (W.B. SaundersCo)
- (3)Invertebrate zoology --Jordan E.L. &P.S.Verma (S.Chand&Co)
- (4) A text book of zoology vol 1 & 2 --Parker &Hswell
- (5) A text book of zoology vol 1 & 2 --Mujupuria& others
- (6)Invertebrate zoology --R.L.Kotpal
- (7)Invertebrate zoology --E.L.Jordan
- (8)Invertebrate zoology --Dr.S.N.Prasad
- (9)Invertebrate structure & function --Barrington
- (10)Invertebrate zoology --Barnes llll
- (12) A textbook of practical zoology invertebrates --S.S.Lal
- (13) A textbook of practical zoology vol 3 & 4 --S.S.Lal

Distribution of Work load and weightage of marks Paper-Z501

Unit Subject Total period Marks

Unit	Subject	Marks	Total period
Unit 1	Systematic	14	09
Unit 2	Forms and Functions in Animals	14	14
Unit 3	Invertebrate Part I (Protozoa to coelenterates)	14	22
Unit 4	Invertebrate Part II (Platyhelminthes to Arthropoda)	14	17
Unit 5	Invertebrate Part III (Mollusca to Hemichordata)	14	10

B.SC Semester V
Zoology Practical Exam Skeleton
Practical Paper No.1
Based on Paper—Z 501

Time : 3 Hrs

Total- 35 Marks

- Que:1 Dissect the given animal and expose the _____ System.**
Show it to examiner. (Practical no 5, 6, 8, 9 & 10) **(05)**
- Que:2 Make a temporary mounting of _____ from the given animal.** **(03)**
(Practical-7 and 11)
- Que:3 Make a temporary preparation from the given material. Stain it if necessary,**
Identify and show it to the examiner. **(03)**
(Practical-12)
- Que:4 Sketch and label as per instruction.** **(04)**
(Practical-14)
- Que:5 Write as per given instruction.** **(10)**
- (1) Identify and classify giving reason (Lower invertebrate)**
(2) Identify and classify giving reason (Higher invertebrate)
(3) Identify and Describe (Practical-13)
(4) Identify and Describe. (Practical-15(a))
(5) Identify and Describe. (Practical-15(b))
- Que : 6 Submission** **(05)**
- Que:6 Certified Journal.** **(03)**
- Que:7 Viva Voce** **(02)**

B.SC Semester V

Zoology Syllabus

Paper-Z-502

Fisheries biology, Animal Husbandry, Bioinstrumentation, Toxicology, Biostatistics

Unit-1 Fisheries Biology

1.1 Inland fisheries and fish pond

1.2 Induced breeding

1.3 Nutrition in fish

1.4 Fish feed

1.5 Fish Diseases

(Dropsy, Fungus infection, Gill rot, White spot, Costiasis, Argulus diseases)

1.6 Fish by product

1.7 Post harvesting technique

Unit-2 Animal Husbandary

2.1 Apiculture

Life cycle of honey bee

Behaviour

Procedure of apiculture and Application

2.2 Sericulture

Life history

Rearing of silk worm

Unit-3 Bioinstrumentation

3.1 Electrophoresis

3.2 Chromatography

3.3 Vectors (YAC, BAC, Plasmid, Bacteriophage)

3.4 Restriction Enzymes

3.5 General introduction of cloning

Unit-4 Toxicology

4.1 Introduction of toxicology

4.2 Classification of toxicants

4.3 Metal as toxicants (Arsenic, Fluoride and Lead)

Unit-5 Biostatistics

5.1 Introduction

5.2 Mean

5.3 Median

5.4 Mode

5.5 Standard Deviation

5.6 Standard Error

5.7 Application

B.SC. Semester-V
Zoology Practical Syllabus
Based on Paper-Z-502

Unit -1 Fisheries Biology

Classification of fishes

Part 1 (1) Tiger Shark (2) Hammer headed shark (3) Electric ray (4) Pristis (5) Trygon
(6) Chimera (7) Protopterus (8) Acipensor.

Part 2 (1) Lepidosteus (2) Diadon (3) Labeo (4) Ophiocephalus (5) Anguilla (6)
Anabas (7) Syngnathus (8) Ostracion.

Part 3 Edible fishes and animal of Saurashtra Sea-coast.

(1) Prawn (2) Lobster (3) Loligo (4) Oyster (5) Pomfret (6) Bombay Duck (7)
Ghol fish (8) Dara fish (9) Koth (10) Shark (11) Catla (12) Mrigal.

Part-4 Fish by product

Part-5 Post harvesting technique (Sun drying, canning, freezing, salting)

Unit-2 Animal Husbandry

Part 1 Apiculture

(a) Life cycle of Honey Bee

Part 2 Sericulture

(b) Life cycle of silkworm

Unit-3 Bioinstrumentation

3.1 To make a culture of E.coli

3.2 Vectors by chart

3.3 Micro organism by slide preparation

Yeast and Bacteria (from stain method)

3.4 To study SDS electrophoresis

3.5 Detection of amino acid by paper chromatography

Unit-4 Toxicology

4.1 Effect of toxicants on human body

Unit-5 Biostatistics

5.1 Mean (any one example)

5.2 Median (any one example)

5.3 Mode (any one example)

5.4 Standard Deviation (any one example)

5.5 Standard Error (any one example)

PRACTICAL INDEX

Practical no 2 Based on PaperZ-502

1. Classification of fish (Part I)
2. Classification of fish (Part II)
3. Important edible fishes and some invertebrate of Saurashtra sea-coast
4. Study of fish by-product
5. To study post harvesting technique
6. To study life-cycle of Honey bee and silk worm
7. To study Preparation of culture of E.coli
8. To study Vectors by chart
9. To study how to make insulin using rDNA technology by chart
10. To study SDS electrophoresis
11. To study detection of amino acid by paper chromatography (model/chart)
12. To study microorganism by slide preparation(Yeast & Bacteria)
13. To study effect of Arsenic, fluoride and lead on human body (chart/Photographs)
14. To study example of Mean median and mode (one example for each)
15. To study example of Standard deviation and standard error (one example for each)
16. Visit to any one national park or sanctuary or fish processing plant or fishing area or reserve forest area or any educational institute which is relevant to the subject

A list of references books of Paper-502

- (1) Fish & Fisheries of India ---V.G.Jhingram
- (2) Fishes an introduction to Ichthyology ---Paper and Moyle
- (3) Hand book of tropical aquarium fishes ---HerberR.Axclrod
- (4) Marine fisheries ---D.V.Bal ,K.V.Rao
- (5) Ichthyology ---S.Chand
- (6) Text book of applied entomology --Srivastava
- (7) Economic zoology --Shukla &Upadhyaya
- (8) Pest management & Pesticides Indian scenario --Nyar B.V.
- (9) Wild life of Gujarat --H.S.Sing
- (10) Natural inheritance in Gujarat --H.S.Sing
- (11) Poultry science --MihirSuthar
- (12) Elements of Bio-technology --P.K.Gupta
- (13) Molecular Biology & Biotechnology --R.A.Meyers
- (14) Biotechnology --KeshavTrehan
- (15) Fundamentals of computers --V.Rajaraman
- (16) Fish & Fisheries --Pandey & Shukla

Distribution of Work load and weightage of marks Paper-Z502

Unit Subject Total period Marks

Unit	Subject	Marks	Total period
Unit 1	Fisheries Biology	14	18
Unit 2	Animal Husbandry	14	05
Unit 3	Bioinstrumentation	14	20
Unit 4	Toxicology	14	10
Unit 5	Biostatistics	14	17

B.Sc. Semester V
Zoology Practical Exam Skeleton
Practical Paper No.2
Based on Paper—Z502

Time: 3 Hrs

Total- 35 Marks

Que: 1 Write as per instruction. (20)

- (1) Identify and classify giving reason (Practical-1)**
- (2) Identify and classify giving reason (Practical-2)**
- (3) Identify and describe (Practical-4)**
- (4) Identify and describe (Practical-5)**
- (5) Identify and describe (Practical-7)**
- (6) Identify and give its economic importance (Practical-3)**
- (7) Identify and describe (Practical-8)**
- (8) Identify and Describe (Practical-9/10/11)**
- (9) Identify and comment on economical importance (Practical- 6)**
- (10) Identify and describe (Practical- 13)**

Que:2 Make a temporary slide of microorganism (Practical-12) (04)

Que:3 Calculate example (Practical 14/15) (03)

Que :4 Submission of tour report (03)

Que:5 Viva-voce (02)

Que:6 Certified Journal (03)

B.SC
Zoology Syllabus
Semester V
Paper-Z-503

Biochemistry Part-I, Biochemistry Part-II, Cytology, Genetics, Fundamental Processes

Unit-1 Biochemistry Part -I

1.1 Carbohydrates

Classification of carbohydrate

Metabolism of carbohydrate

(a) Glycolysis

(b) Glycogenesis

Importance of carbohydrate

1.2 Proteins

General Structure of amino acids

Classification of amino acids (essential and non-essential)

Classification of protein

Structural organization of Protein (Primary, Secondary, tertiary and quaternary)

Metabolism of Protein - Urea cycle

Importance of protein

1.3 Vitamins

Introduction, Source, function and deficiency

Unit-2 Biochemistry Part -II

2.1 Lipid

Classification of lipid

β- Oxidation

Importance of lipid

2.2 Enzymes

Introduction, Definition, Chemical Nature and properties

Classification and types of enzyme

Factor affecting enzyme activity

(Temperature, PH, enzyme concentration, substrate concentration, and radiation)

Mechanism of enzyme action (Lock and Key theory and Induce fit model)

2.3 Minerals

Introduction, Source, function

Unit-3 Cytology

3.1 Cytoskeleton

3.2 Cell cycle

3.3 Cancer

(a) Introduction (b) Types of cancer (c) Characteristics of cancerous cells

3.4 Possible causes of cancerous growth of Carcinogenesis by

• Mutation theory (2) Virus theory (3) metabolic theory (4) Hormonal disturbance theory (5) Irritation theory.

Unit-4 Genetics

4.1 Molecular genetics Concept of gene

Molecular structure of gene

Chromosomal mutation-only structure

(Deletion, duplication, inversion, translocation)

4.2 Mutagenic agent

4.3 Prenatal sexes and diagnosis (amniocentesis)

4.4 Human hereditary traits (pedigree analysis)

(Colour blindness, Haemophilia, ear pinna and Baldness).

4.5 DNA fingerprinting

Unit-5 Fundamental Processes

5.1 Types of DNA and RNA

5.2 Types of Replication

5.3 DNA Replication

5.4 Transcription

5.5 Translation

B.SC. Semester-V
Zoology Practical Syllabus
Practical -3
Based on Paper-Z-503

Unit-1 &2 Biochemistry

- Detection of carbohydrates
- Glucose (2) Maltose (3) Starch
- Detection of proteins from milk
- Detection of proteins from egg
- Detection of lipids

Unit-3 Cytology

2.1 Temporary preparation of mitosis cell division

Onion root tip

2.2 Temporary preparation of meiotic cell division From plant material(Bud of tradeschantia)

Unit-4 Genetics

3.1 Temporary mounting of bar body

3.2 To study Chromosomes from drosophila/chironomous Larva by permanent slide

3.3 Pedigree analysis

(1) Transmission of autosomal recessive trait

Eg:-Thalasemia

- Transmission of sex linked recessive trait

Eg:- Red-green colour blindness and hemophilia

- Transmission of Y linked dominate trait.

A. Hairy pinna

B. Baldness

Unit -5 Fundamental Processes

Process of DNA replication by chart

Process of transcription by chart

Process of translation by chart

PRACTICAL INDEX

Practical no 3 Based on PaperZ-503

1. Detection of glucose
2. Detection of maltose
3. Detection of starch
4. Detection of protein from milk
5. Detection of protein from egg
6. Detection of lipid
7. Temporary preparation of mitosis cell-division from onion root-tip
8. Temporary preparation of mieosis cell-division from bud of Tradenschantia
9. Temporary preparation of barr body
- 10..To study a transmission of autosomal recessive trait
- 11..To study transmission of sex-linked chromosome trait
12. To study tranmission of Y-linked dominant trait
- 13.To study process of DNA replication by chart
- 14.To study process of transcription by chart
- 15.To study process of translation by chart

A list of references books of Paper-503

- (1) Biochemistry ----Das Gupta S.K
- (2) Biochemistry ---Stryer.L.
- (3) Out line Biochemistry ---Conn.et.al
- (4) Molecular biology of the cell ---
Alberts et.al (5) Molecular boiology --
--Arumajan
- (6) Cell in development
& Inheritance ---Wilson E.B.
- (7) Principle of Biochemisry ---Lehninger
- (8) Cell molecular biology ---De Roberties& De Roberties
- (9) GeneVII ----Lewin
- (10) Cytology ----VeerbalaRastogi
- (11) Cytology ---Agarwal
- (12) Genetics ---Meyyer& Anderson
- (13) Genetics ---Edger Altenburg
- (14) Cytology, Genetics & Evolution ---P.K.Gupta
- (15) Genetics ---Strick berger

Distribution of Work load and weightage of marks Paper-Z503

Unit Subject Total period Marks

Unit	Subject	Marks	Total period
Unit 1	Biochemistry-I	14	18
Unit 2	Biochemistry-II	14	12
Unit 3	Cytology	14	10
Unit 4	Genetics	14	18
Unit 5	Fundamental processes	14	12

B.SC Semester V
Zoology Practical Exam Skeleton
Practical Paper No.3
Based on Paper—Z503

Time : 3 Hrs

Total- 35 Marks

Que:1 Detect the components with biochemical test from the given sample.

Write each step in answer book, show it to the examiner. (Practical 1 to 6)

(08)

**Que:2 Perform the practical as per instruction and write in answer book,
show it to examiner. (Practical 10 to 12)**

(08)

**Que:3 Make a temporary stain preparation of _____ as per
examiner instruction. (Practical 7 to 9)**

(08)

Que:4 Write as per given instruction

(06)

(1) Identify and describe (Practical 07 and 08)

(2) Identify and describe (Practical 13 to 15)

(3) Identify and comment upon biochemical test. Write a final conclusion

(4) Identify and describe (Practical 10 to 12)

Que:5 Viva-voce

(02)

Que:6 Certified Journal

(03)

B.SC
Zoology Syllabus
Semester VI
Paper-Z-601

Functional Anatomy of Chordates & Comparative Study

Unit-1 Systematic

- Salient features and classification up to orders in proto chordate and lower chordate.
- Salient features and classification up to orders in higher chordate.

Unit-2 Form and function in animals

2.1 General structure and morphology with functional anatomy of following type animals

[A] Class- Aves- Pigeon

External features
Digestive system,
Heart
Arterial system
Venous system
Reproductive system
Brain (By chart)

[B] Class-Mammals- Rat

External features
Digestive system,
Heart
Arterial system
Venous system
Reproductive system
Brain (By chart)

Unit-3 Chordate Part I (Urochordata to Amphibia)

3.1 Urochordata:- Affinities

3.2 Pisces :- General organization and affinities of dipnoi, air bladder of fishes,
Migration in fishes and Parental care in fish

3.3 Amphibia :- Neotony, Parental care, Aestivation and Hibernation

Unit-4 Chordate Part II (Reptiles to Mammals)

4.1 Reptiles :- Temporal fossae

Living fossils-Sphenodon

4.2 Aves :- Archaeopteryx as connective link between reptiles and aves

Migration in birds

Types of Feathers (Seed eating, Fruit eating, insectivores, tearing and piercing, water and mud straining beak)

Types of beaks and claws (Running feet, Perching feet, scratching feet, Raptorial feet, swimming feet)

4.3 Mammals :- Egg laying mammals (Monotremes)

Pouched mammals (Marsupials)

Placental mammals- Chiroptera,

Primates (Lemur, Loris, chimpanzee, gorilla, macaca)

Carnivore (Asiatic lion, tiger, cheetah, Sloth bear)

Cetacean (Sperm whale, killer whale, dolphin, blue whale.)

Unit-5 Comparative anatomy of chordates

5.1 Comparative study of heart (Shark, frog, calotes, Pigeon and Rat)

5.2 Comparative study of aortic arch (Shark, frog, calotes, Pigeon and Rat)

5.3 Comparative study of brain (Shark, frog, calotes, Pigeon and Rat)

5.4 Dentition: - Types of teeth and dental formula in mammals.

B.SC.
Zoology Practical Syllabus
Semester-VI
Practical -1
Based on Paper-Z-601

Unit-1 Identificaiton classification upto order

- 1.1 Urochordata :- Ciona, Salpa, Pyrosoma
- 1.2 Cephalochordata :- Amphioxus
- 1.3 Cyclostomata :- Lamprey
- 1.4 Fish :- Hammer headed, Barbus
- 1.5 Amphibia :- Bombinator, Uraeotyphlus, Alytes, Triturus
- 1.6 Reptiles :- Hemidactylus, Natrrix, Python, Krait, Russells viper, pitviper
- 1.7 Aves :- Archaeopteryx, Eagle, Bubobus
- 1.8 Mammals :- Talpa, Porcupine

Unit-2 Form and function in animals

2.1 Pigeon :-

- External features
- Digestive system,
- Arterial system
- Venous system
- Reproductive system
- Brain (By chart)

2.2 Rat :-

- External features
- Digestive system,
- Arterial system
- Venous system
- Reproductive system
- Brain (By chart)

2.3 Mounting:- Pigeon : (Pectin and Air sac)

Rat: (Striated muscle and blood)

Unit-3 Preparation from preservative materials

3.1 Amphioxus

3.2 Filoplume feather

3.3 Down feather

Unit-4 General Practicals Parental care in fishes:-Amia, Hippocampus

4.1 Migration in fishes:- Salmon, Hilsa

4.2 Sphenodon by chart or model

4.3 Archeopteryx by chart or model

4.4 Types of Feathers (Seed eating, Fruit eating, insectivores, tearing and piercing, water and mud straining beak)

4.5 Types of beaks and claws (Running feet, Perching feet, scratching feet, Raptorial feet, swimming feet)

Unit-5 Comparative Anatomy

5.1 Heart

5.2 Aortic arch

5.3 Brain

5.4 Dentition in mammals:- Dog, Pig, Goat, Horse, Dog and Cow.

PRACTICAL INDEX

Practical no 1 Based on PaperZ-601

1. Classification of protochordata to Amphibia
2. Classification of reptiles to mammals
3. To study digestive system, arterial , venous, brain, reproductive system of Pigeon
4. To study digestive system, arterial , venous, brain, reproductive system of rat
5. To study mountings of rat (Striated muscle and blood and pectin)
6. Preparation from preservative materials
7. To study parental care in fishes
8. To study migration in fishes
9. To study sphenodon through chart or model
10. To study Archaeopteryx by chart or model
11. To study types of beaks and claws in birds
12. To study a comparative account of Heart
13. To study a comparative account of Aortic arch
14. To study a comparative account of Brain
15. To study dentition in mammals

A list of References Book of Paper –Z601

- Vertebrate Zoology --R.L.Kotpal
- Vertebrate Zoology --E.L. Jordan
- Vertebrate Zoology --Dr. S.N. Prasad
- A student text book of zoology vol.1&2 --Adan Sedwick
- Chordate structure and function --Waerman A.J.
- Analysis of vertebrate structure --Hilcle Brand
- An outline of comparative anatomy --Kingsley
- The vertebrate body --Romer&Persons
- Zoology of chordates --Nigam H.S.
- The chordates --Alexander R.M.
- An introduction of comparative zoology --Whifield&Wood
- A text book of practical zoology-Vertebrate --S.S. Lal
- A text book of practical zoology Vol III &IV --S.S.Lal

Distribution of Work load and weightage of marks Paper-Z601

Unit Subject Total period Marks

Unit	Subject	Marks	Total period
Unit 1	Systemics	14	08
Unit 2	Form and function in animals	14	25
Unit 3	Chordate Part I	14	12
Unit 4	Chordate Part II	14	07
Unit 5	Comparative anatomy of chordates	14	18

B.SC
Zoology Practical Exam Skeleton
Practical Paper No.1 Semester VI
Based on Paper—Z601

Time : 3 Hrs

Total- 35 Marks

Que:1 Dissect/Sketch and labeled _____ in _____ and show it to the examiner (Practical- 3 and 4) (06)

Que:2 Mounting/ Sketch and labeled _____ in _____ and show it to the examiner (Practical-5) (03)

Que:3 Identify and explain in detail. Write and sketch a comparative account in answer book (Practical- 12 to 13) (04)

Que:4 Make a temporary preparation from given material. Stain it if necessary, Identify and show it to examiner (Practical- 6) (03)

Que:5 Write as per given instructions: (10)

(1) Identify and classify giving reasons (Practical-1)

(2) Identify and classify giving reasons (Practical-2)

(3) Identify and describe (Practical- 7 & 8)

(4) Identify and describe (Practical-9 & 10)

(5) Identify and describe (Practical-11)

Que:6 Any five photographic presentation of animals(vertebrates) (Description with academic value) (05)

Que:7 Viva-voce (02)

Que:8 Certified Journal (02)

B.SC Semester VI

Zoology Syllabus

Paper-Z-602

Cardiovascular system, Respiration and Muscular System, Endocrinology and Reproduction, Immunology and Sense organ and Histology

Unit-1 Cardiovascular System

1.1 Heart:- Structure, origin, conduction and regulation of heart beat, cardiac cycle and E.C.G.

1.2 Blood pressure

1.3 Physiology of blood clotting

Best and Tylor' theory

Howell's theory

Unit-2 Respiration and Muscular system

2.1 Exchange of gases

2.2 Transport of gases

2.3 Respiratory pigment

2.4 Structure and function of skeletal muscle

Unit-3 Endocrinology and Reproduction

3.1 Introduction of endocrine gland

3.2 Types of hormone

3.3 Endocrine gland and its hormone

3.4 Menstrual cycle

3.5 Oestrus cycle

Unit-4 Immunology and Sense Organ

4.1 Introduction of immune system

4.2 Innate immunity

- 4.3 Adaptive immunity
- 4.4 Ig structure and its type
- 4.5 Gustato receptor
- 4.6 Photo receptor
- 4.7 Phono receptor

Unit-5 Histology

- 5.1 Principles involved in general techniques for tissue fixation
 - (a) Preparation
 - (b) Sectioning
 - (c) Staining
- 2.2 General account of different types of fixatives
- 2.3 A knowledge of stains and preparation of different stains:-
 - (a) Eosin
 - (b) Haematoxyline
 - (c) Toludine blue (d) Methyl blue
 - (e) Acetocarmine
- 2.4 Histological structure
 - (a) Adrenal gland
 - (b) Ovary
 - (c) Testis

B.SC. Semester-VI
Zoology Practical Syllabus
Practical -2
Based on Paper-Z-602

Unit 1 Physiology

- 1 Red blood corpuscles (Erythrocytes) count
- 2 White blood cell (Leucocytes) count
3. Haemoglobin estimation
- 4 To check the blood pressure
- 5 Counting of pulse rate at rest and after exercise
6. Preparation of Haemin crystals

Unit:2 Histology

- 1 a study of various kinds of fixatives(one each made in alcohol, acetic acid and aqueous Bouin's fluid, Carnoy's fluid)
- 2 A study of various kinds of stains(Eosin, Haemotoxylin, Methyl blue, Acetocarmine)
- 3 A process of making permanent histological slide by single staining technique
- 4 A process of making permanent histological slide by double staining technique
- 5 a study of histological structure through permanent slides (Adrenal gland, testis, ovary)
- 6 To study of micro technique and preparation of permanent histological slides
 - 5.1 Collection of tissue and fixation
 - 5.2 Washing in running tap water
 - 5.3 Dehydration
 - 5.4 Dealcoholization (clearing)
 - 5.5 Embedding

5.6 Block preparation

5.7 Sectioning

5.8 Staining and mounting 6.9 Identification and naming of slides

PRACTICAL INDEX

Practical no 2 Based on Paper Z-602

1. Red blood corpuscles count
2. White blood cell count
3. Haemoglobin estimation
4. To check the blood pressure
5. Counting of pulse rate at rest and after exercise
6. Preparation of haemin crystals
7. A study of various kinds of fixatives
8. A study of various kinds of stain
9. A study of histological structure through permanent slides
10. Obtaining the tissue and fixation
11. To wash in running tap-water
12. Dehydration and De-Alcoholization (clearing)
13. Embedding and Block preparation
14. Sectioning, Staining and mounting
15. Identification and naming of slide

A list of References Book of Paper –Z602

- Animal physiology --Eckert
- Essential of animal physiology --S.C.Rastogi
- Element of animal physiology --R.Nagabhushanam
- General and comparative physiology --Hoar
- Human physiology --Cheterji
- Principal of animal physiology --Wood D.W.
- Physiology of animal --Tortora&tortora
- Comparative animal physiology --Prosser C.L.
- Text book of Baley's Histology --Copenharverbunga&burge
- Endocrinology --Hadley
- Hand book of experimental physiology&biochemistry
--Dr.P Vijay Chandha
- Animal Physiology --Richard W. Hill
- A text-book of the principles of animal histology. -- Ulrie Dahlgren
- Practical Haematology -- Dacie and Lewis
- Animal physiology --Shastri&Gohil

Distribution of Work load and weightage of marks Paper-Z602

Unit Subject Total period Marks

Unit	Subject	Marks	Total period
Unit 1	Cardiovascular system	14	12
Unit 2	Respiration and Muscular system	14	15
Unit 3	Endocrinology and Reproduction	14	23
Unit 4	Immunology and Sense organ	14	13
Unit 5	Histology	14	07

B.SC
Zoology Practical Exam Skeleton
Practical Paper No.2 Semester VI
Based on Paper—Z602

Time : 3 Hrs

Total- 35 Marks

- Que:1 Make a permanent slide from the given histological material with staining technique and show it to examiner (06)**
- Que:2 Set up _____ experiment and write in answer book (08)**
- Que:3 Check the blood pressure/Counting of pulse rate (04)**
- Que:4 Write as per given instruction (08)**
- (1) Identify and comment on histological structure**
- (2) Identify and comment on functional activities or write a detail formula with proper effect**
- (3) Identify and describe**
- (4) Identify and describe**
- Ques:5 Submission of permanent slide / W.M (05)**
- Que:6 Viva-voce (02)**
- Que:7 Certified Journal (02)**

B.SC
Zoology Syllabus
Semester VI
Paper-Z-603

Reproductive physiology and Embryology, Developmental biology, Wild life, Ecology & Environmental pollution, Evolution

Unit 1 Reproductive physiology and Embryology

- 1.1 Structure and function of mammalian ovum
- 1.2 Structure and function of mammalian sperm
- 1.3 Structure of mammary gland
- 1.4 Fertilization, Cleavage, blastula, gastrula and embryonic development of chick upto 72.

Unit 2 Developmental biology

- 2.1 Parthenogenesis in general
- 2.2 Placenta and placentation
Types on basic attachment and histological structure
- 2.3 Regeneration
Planaria and salamander

Unit -3 Wild life

- 3.1 Hotspots of biodiversity
- 3.2 Endangered and endemic species of india
- 3.3 Keystone species
- 3.4 Insitu and Exsitu conservation
- 3.5 Wild life agencies- WWF, Indian Board of wild life, CITES.
- 3.6 Sanctuaries and national parks of India.

(National park: Jim Corbett, Ranthambhor, Periyar, Kaziranga, Kanha)

(Sanctuaries: Dachigam, Keoladeo, Madhumalai, Chilika lake, Manas)

Unit 4 Ecology & Environmental pollution

- 4.1 Air pollution
- 4.2 Water pollution

4.3 Soil pollution

4.4 Green house effect

4.5 Bio-geochemical cycle- O₂, N₂, Co₂, H₂S, Ph

4.6 Population ecology

Population density, Natality, Mortality, Age distribution, Population growth, Population equilibrium.

Unit 5 Evolution

Zoo geographical distribution

Macro and micro evolution

Geological Period

Evolution of man

B.SC. Semester-VI
Zoology Practical Syllabus
Practical -3
Based on Paper-Z-603

Unit 1 &2 Reproductive physiology & developmental biology

- 1.1 To study permanent slide of mammalian ovum(T.S.) and oogenesis process by chart/multimedia teaching method
- 1.2 To study permanent slide of mammalian sperm(T.S.) and spermatogenesis process by chart/multimedia teaching method
- 1.3 To study T.S. mammary gland by chart/multimedia teaching method
- 1.4 A study of permanent slide of chick embryo
(18, 24, 33, 48, & 72 hrs)
- 1.5 T.S. of chick embryo showing the development of neurulation (24, 33 hrs)
- 1.6 T.S. of chick embryo showing the development of heart (24, 33 hrs)
- 1.7 Mounting of chick embryo Any 2 stage of embryonic development

Unit-3 Wildlife

- 3.1 Study of wild animals foot print (Lion, Leopard, Tiger, Sambhar, spotted deer, Hyena)
- 3.2 National parks and sanctuaries of India.
(National park : Jim Corbett, Ranthambhor, Periyar, Kaziranga, Kanha)
(Sanctuaries :Dachigam, Keoladeo, Madhumalai, Chilika lake, Manas)
- 3.3Endemic Species of india
 - (a) Amphibia and Reptiles : Indian bull frog, tree frog, Gharial, Star tortoise
 - (b) Birds : ParadisFlycather, Bee eater, Flamingo, Great Indian bustard
 - (c) Mammals : Chital, Barasingha, Hangul deer, Lion tailed macaque

Unit -4 Ecology & Environmental pollution

- 4.1 An estimation of total hardness
- 4.2 Estimation of O₂ from tap water
- 4.3 Estimation of O₂ from polluted water
- 4.4 Estimation of chlorinity and salinity from tap water
- 4.5 Estimation of chlorinity and salinity from polluted water
- 4.6 To study physical characterisitcs of soil texture, colour and temperature
- 4.7 To study Water holding capacity of soil

Unit 5 Evolution

5.1 A study of zoogeography distribution

5.2 Evolution of man

Java man, Neanderthal man, Rhodesian man, Cro magnon man, modern man

PRACTICAL INDEX

Practical no 3 Based on PaperZ-603

1. To study permanent slide of mammalian ovum, sperm, mammary gland (T.S.) and oogenesis and spermatogenesis process
2. To study of T.S. of neurulation in chick embryo by permanent slide
3. To study of development of T.S. of heart in chick embryo by permanent slide
4. To study a chick embryo development by mounting (any one stage) and permanent slide
5. To study National parks and Wild life sanctuaries of India
6. To study endemic amphibian to mammals species of India
7. To study estimation of total hardness
8. To study estimation of O₂ from tap water
9. To study estimation of O₂ from polluted water
10. To study estimation of chlorinity and salinity in tap water
11. To study estimation of chlorinity and salinity in polluted water
12. To study physical characteristics of soil texture, colour and temperature
13. To study water holding capacity of the soil
14. To study zoo-geographic distribution.
15. To study evolution of man.

A list of references books of Paper-603

- (1) Reproductive Physiology ---Nalbandov A.V
- (2) Reproductive cycles ---Saidapur S.K.
- (3) General Endocrinology ---Bagnara&Turne
- (4) Introduction of Embryology ---Balansky
- (5) A text book of Embryology ---Pattern
- (6) Chordate Embryology ---Verma& Others
- (7) An outline of
Animal development ---Deven Port
- (8) Development of Biology ---Shubremaniyam
- (9) Development of Biology ---Gilbert
- (10) Introduction of Evolution ---Moody
- (12) Evolution ---Savoge
- (13) Evolution ---Franklin Shull
- (14) Zoo Geography ---Darlington
- (15) Organic Evolution ---Arumugun
- (16) Environment Science ---Turk & Turk
- (17) Principle of Environment Biology ---P.K.G.Nair
- (18) Fundamental of Ecology ---Odum
- (19) Ecology ---Ricklets
- (20) Elements of Ecology ---Sharma & Mishra
- (21) Practical zoology ---
- (22) Environmental studies ---S.V.S.Rana

Distribution of Work load and weightage of marks Paper-Z603

Unit Subject Total period Marks

Unit	Subject	Marks	Total period
Unit 1	Reproductive Physiology and Embryology	14	15
Unit 2	Developmental biology	14	15

Unit 3	Wildlife biology	14	15
Unit 4	Ecology & Environmental pollution	14	10
Unit 5	Evolution	14	15

B.SC
Zoology Practical Exam Skeleton
Practical Paper No.3 Semester VI
Based on Paper—Z603

Time : 3 Hrs

Total- 35 Marks

Que:1 Make a temporary embryo mounting from the given egg. Stain and identify the age of the embryo and show it to the examiner (07)

Que:2 Estimation of _____ from given sample. Write each step in answer book and show it to examiner (07)

Que:3 Check the _____ from the given sample. Write each step in answer book and show it to examiner (04)

Que:4 Write as per given instructions (08)

(1) Identify and describe

(2) Identify and describe

(3) Identify and describe

(4) Identify and describe

Que:5 Tour report (05)

Que: 6 Viva voce (02)

Que:7 Certified Journal (02)