## B.SC ZOOLOGY

### FIRST YEAR

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<tr>
<th>Sl. No.</th>
<th>Papers</th>
<th>Max. Marks</th>
<th>Exam Hrs.</th>
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<tr>
<td>1.</td>
<td>Hindi</td>
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<td>2.</td>
<td>English</td>
<td>100</td>
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<td>3.</td>
<td>Invertabrata</td>
<td>100</td>
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<td>4.</td>
<td>Botany</td>
<td>100</td>
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<td>5.</td>
<td>Practical 1: Invatabrata</td>
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<td>Practical 2: Botany</td>
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<td>Chordata</td>
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<td>Allied Microbiology</td>
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<td>Practical 3: Chordata</td>
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<td>Practical 4: Allied Microbiology</td>
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<td>1.</td>
<td>Embryology</td>
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<td>2.</td>
<td>Ecology, Animal Physiology</td>
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<td>3.</td>
<td>Genetics</td>
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<td>Evolution</td>
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<tr>
<td>5.</td>
<td>Embryology &amp; Ecology</td>
<td>100</td>
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<td>6.</td>
<td>Practical 5: Ecology, Genetics &amp; Evolution</td>
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SYLLABUS
FIRST YEAR

Paper – 1
HINDI- I

Paper – 2
ENGLISH PAPER – I

Detailed Text

PROSE
1. In Prison – Jawaharlal Nehru
2. What is Science? – George Orwell
3. On Marriages – Nirad Chaudari
4. The Luncheon – N. Somerset Maugham
5. The Mourners – V. S. Naipaul
6. The Plane Crash – Juliane Koepcke

POETRY
1. Polonius’ Advice to his Son – William Shakespeare
2. Every Town a Home Town - Kaniyan Purkunran
3. The Village Schoolmaster – Oliver Goldsmith
4. The Solitary Reaper – William Wordsworth
5. On his Blindness – John Milton
6. The Tyger – William Blake

Non-Detailed

The following stories
1. The Gifts – O. Henry
2. The Two Friends – Guy de Maupassant
3. The Bear Hunt – Leo Tolstoy
4. The Goblins and the Grave Digger – Charles Dickens
5. The Nightingale and the Rose – Oscar Wilde

GRAMMER
1. Articles and Prepositions
2. Infinitives and Gerunds
3. Five basic sentence patterns (SV SVC, SVO, SVOO, SVOC(A))
4. Arranging the component parts so as to form a sentence
5. Language work at the end of all lessons
6. Language work at the end of all lessons
7. Question Tag, Active and Passive Voice
8. Degrees of Comparison

COMPOSITION
1. Letter Writing (Formal and Informal)
2. Developing the hints
3. Comprehension
4. Writing Telegram
5. Completion of a passage
6. Precis Writing

Paper 3
INVERTAEBRATA

Unit – I ARTHROPODA
Penaeus and Cockroach,
Peripatus and limulus: Structure and affinities.

Unit – II
Larval forms in crustacea and parasitic crustacean, Prawn cluture, Insect mouth parts and their modifications, social life and economic importance of Insects, Arthropod Vectors of Human Welfare.

**Unit – III**  **MOLLUSCA:**

Pila, Freshwater Mussel and sepia.

**Unit – IV**

Food modification and Respiratory organs in Mollusca, Torsion in Gastropoda, Economic importance of Mollusca.

**Unit – V**  **ECHINODERMATA**

Starfish, Sea cucumber, Sea Urchin and Sea lilly. Water Vascular system, Echinoderm larvae and their significance.

**References:**


**Paper – 4**

**ALLIED I BOTANY**

**UNIT – I Introduction:**


2. Study of, structure, life cycle and economic importance of the following:
   a) Algae – Nostoc, Chlamydomonas, Oedogonium, Chara, Ectocarpus.
   b) Fungi – Albugo, Yeast, Polyporus, Puccinia, Alternaria.
   c) Bryophytes – Marchantia, Anthoceras.
d) Pteridophytes – Selaginella, Equisetum.
e) Gymnosperms – Pinus.

UNIT – II 1. Anatomy


2. Cytology and Embryology :

b) Structure and development of anther, male gametophyte, ovule and female gametophyte – Fertilization – Development and structure of dicot embryo.

UNIT – III : 1. MORPHOLOGY

a) Root – types, modifications and functions.
b) Stem – functions, modifications.
c) Leaf – Phyllotaxy, simple and compound leaves – modifications of leaves.
d) Flowers – parts, functions, inflorescence, racemose, cymose and special types.
e) Fruit – simple, aggregate, multiple fruits – fleshy, dry fruits – dry dehiscent and indehiscent fruits, dispersal of seeds and fruits.

2. TAXONAMY OF ANGIOSPERMS:

Outline classification of Linneaus and Bentham and Hooker – study of characters and economic importance of the following families:

1. Annonaceae.
2. Leguminosae.
3. Cucurbitaceae.
4. Asteraceae.
5. Apocyanaceae
6. Solanaceae
7. Lamiaceae
8. Euphorbiaceae.
9. Liliaceae.
10. Archidaceae.

UNIT – IV Plant physiology

UNIT – V Plant ecology, genetics and evolution:
1. Ecological factors – biotic, abiotic and climatic factors – Ecosystem – Concept – pond is an ecosystem – Classification of water based on water relationship – hydrophyte, mesophyte and xerophyte – vegetational types of Tamil Nadu.

Reference:
1. College Botany, Henry Holt & Co, Fuller, H.J. & Tippo. O.

Practical – INVERTABRATA
1. Studies of Museum Specimens and Slides relevant to the types studied in theory.
2. Dissection of:
   a. Earthworm : Nervous system
   c. Pila : Digestive system
3. Mounting of:
a. Body and Penial Setae in Earthworm
b. Mouth Parts of:
   i. Mosquito
   ii. Cockroach
   iii. Honey Bee
c. Salivaryglands of Cockroach
d. Appendage of prawn
e. Redula of Pila

4. **SPOTTERS**
   The student must be through with the following mounted slides and specimens. As this is the minimum number of specimens to be studied these should be procedure well in advance and kept ready for practical examination.

   **List of mounted Slides and Specimens**

   a. **Classify Giving Reasons:**
   
   b. **Drawn Labelled Sketches:**
   
   c. **Comment on Biological Significance:**
      Entamoeba, sponge gemmule, Physalia, Heteronereis, Chaetopterus, Sacculina, Peripatus, Limulus, Nautilus, Bipinnaria larva.
   
   d. **Relate Structure and Function**
      Spicules (sponges), Taenia-Sclex, Nereis-Parapodium, Antenule of Prawn, Pila-radula, Sepia-arm, Pedicellaria.
   
   e. **Comment on Respiration Arrangement:**
      Chaetopterus, Ascaris, Prawn, Limulus, Chiton, Seaurchin, Holothurian, Starfish.

5. **Record**
The record must include a brief report of a filed study, undertaken by the student during the course of the year.

References:
2. Dr.Rastogi V.B A Manual of Invertebrate Practical Zoology, Kedarnath Ramanath, Meerut.

Practical – 2

ALLIED BOTANY PRACTICALS;
1. To make suitable micro preparations – for algae, fungi, bryophytes, Pteridophytes, Angiosperms and Gymnosperms given in the syllabus.
2. To make preparation for microscopical observation for anatomical specimens.
3. Observation of anther and ovule - structure and developments.
4. To describe technical terms of plants, belonging to the families prescribed and their identification.
5. Dissection of flower and construction of floral formula and floral diagram.
6. To describe simple experiment set up in plant physiology part of the syllabus.

SECOND YEAR

Paper – 5
, HINDI- I

Paper – 6
ENGLISH PAPER – II

Detailed Text

PROSE
8. A Visit to India – Julian Huxley
9. University Days – James Thurber
10. I Have a Dream – Martin Luther King
11. The Story Teller – H.H. Munro (Saki)
12. George Bernard Shaw – Bertrand Russel
13. Only then shall we find Courage – Albert Einstein

POETRY
7. The Day is Done – Henry Wadsworth Longfellow
8. King Arthur’s Farewell – Alfred Tennyson
9. O Captain! My Captain! – Walt Whitman
10. My Last Duchess – Robert Browning
11. Ode to a Nightingale – John Keats
12. Lochinvar – Walter Scott

Non-Detailed
A collection of One Act Plays -
1. Remember Ceasar – Gordon Daviot
2. The Proposal – Anton Chekov
3. The Miracle Merchant – Saki
4. The Stepmother – Arnold Bennet
5. The Mahatma – Rama Sarma

GRAMMER
1. Relative Clauses
2. Conditional Sentences
3. Modal auxiliaries
4. Reported Speech
5. Transformation of Sentences
   a. Affirmative, Negative and Interrogative Sentences
   b. Simple, Compound and Complex Sentences
6. a,b,r clauses
7. Correction of Sentences based on
a. Subject, Verb and Concord
b. Tenses
c. Articles and Prepositions.
d. Question Tags

**COMPOSITION**
7. Paraphrasing
8. Dialogue Writing
9. Report Writing
10. Note Making
11. General Essay

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**Paper – 7**

**CHORDATA**

**Unit – I**

General characters and outline classification of phylum-chordata - Origin of chordates, Structure and affinities of Balanoglossus, Ascidian, and Amphioxus, Characters and classification of sub-phylum Hemichordata, Urochordata and Cephalochordata

**Unit – II**

**Class: Pisces** - Characters and classification of Fishes up to order level with examples - Structure of Shark – Structure and affinities of Dipnoi – Types of Fins, Types of Scales – Accessory respiratory organs in Fishes – Migration of Fishes – Parental care in Fishes.

**Class: Amphibia** – General character and classification of Amphibia up to order level with examples. Origin of limbs. – Organization of Frog, Biology and Adaptive feature of Anura and Apoda. – Parental care in Amphibians. – Origin of Amphibia.

**Unit – III**
**Class: Reptilia** - General characters and classification of Reptilia up to order level. – Organization of Calotes. – Types of Skull in Reptiles.

**Class: Aves.** – General characters and Classification of Aves. - Organization of Pigeon. – Flight Adaptation of Pigeon. –Palaeognathae, the flightless birds- Palate in birds Origin of Birds – Migration Birds

**Unit – IV**

**Class: Mammalia** – General Characters and Classification of Mammals – Structural organization of Rat, Biology and distribution of Prototheria, Metatheria and Eutheria – Dentition Mammals – Adaptive Radiation in Mammals – Flying and Aquatic Mammals Adaptations.

**Unit – V**

Comparative anatomy of the organ systems of vertebrates in relation to their adaptations and evolution – Integument, Digestive, Respiratory, Circulatory nervous, Urogenital and Skeletal systems. Study of poisonous and non-poisonous snakes and their identification. – Poisonous and Biting mechanism in Snakes. – Mesozoic reptiles – Affinities of Sphenodon.

**References:**

8. Dr.Rastogi V.B Vertebrate Zoology, Kedarnath Ramnath, Meerut.
11. Young J.Z Life of mammals.
12. George C.Kent & Larry Miller Comp Area of the Vertebrates 8/e Tata McGarw Hill
UNIT – I

1. Introductory Microbiology: Definition, History and evolution of microbiology –
   Taxonomy and classification of Micro-Organisms – Types of microscopes –
   Light, Dark ground – Phase contrast - Electron microscopes.
2. Stains and staining methods – simple, differential and special stains – sterilization
   – Moist heat, dry heat, ionization, Radiation, filtration, disinfectants.

UNIT – II

Ultra structure of microbial cell – Bacteria, fungi, and virus – sub cellular structure and
their function.

Growth regulation – Nutritional requirements – Micro and Macro nutrients – Nutritional
groups Growth curve – factors affecting growth – Batch, continuous and synchronous culture –
Types of culture media.

UNIT – III

Soil and Agricultural Microbiology :

UNIT – IV Food, Dairy and Industrial Microbiology

Microbial food spoilage – methods of food preservation – Food poisoning and food borne diseases – Gastroentistics – by Solmonella, Staphylococcus and Clostridia.

UNIT – V Medical and Environmental Microbiology

2. Environmental Microbiology – Microbiology of air – enumeration of microbes from air – Air samplers and sampling techniques – microbiology of water – bacteriological techniques for the examination of water – BOD, COD.

Reference:

1. Text book of Microbiology, Ananthanarayanan and Jayaram Paniker.
5. Microbiology – Pelzar & Reid.
Practicals

Major Chordata

1. Identification of specimens studied in the theory
2. Shark – V, VII, IX and X cranial nerves, mounting of placoid scales and brain.
3. Frog – Digestive, arterial venous and urogenital systems
4. Calotes – Digestive, arterial venous and urogenital systems
5. Mounting of brain and thyroid apparatus in frog.
6. Identification of prepared skeletal structures of vertebrate
7. Spotters.

ALLIED II MICROBIOLOGY PRACTICALS:

1. Handling of light microscopes.
2. Preparation of Media – Liquid and solid media.
3. Plating techniques – streak plate and pour plate methods.
5. Staining of Fungi – Lactophenol cotton blue staining.
6. Hanging drop method.
8. MBRT – for milk.
9. Isolation of nitrogen fixing organism Azotobacter and Rhizobium.
10. Estimation of bacterial contamination of air by open plate method.
11. Antibiotic sensitivity test.

THIRD YEAR

Paper – 9

EMBRYOLOGY

UNIT – I

UNIT- II : Gametogenesis and fertilization:
1. Definition, process and significance of spermatogenesis and oogenesis – types of sperms – types of eggs and egg membranes – Polarity and symmetry.

UNIT – III : Cleavage and Gastrulation :

UNIT – IV : Tubulation and organogenesis :

UNIT – V
Reference:

Paper – 10
ECOLOGY

UNIT – I


UNIT – II Ecosystem:

Characteristics, components, producers, consumers, decomposers and transformers.

UNIT – III : Population and Population Interactions

2. Population interaction :
   i) Intra specific interactions – Aggregation, Social organization, divisions of labour and Social behavior, Territorialism, migration.
ii) Intra specific interaction – Neutralism, commensalism, synergism, mutualism, symbiosis, Ammensalism, Antagonism, parasitism, competition and predation.

UNIT – IV : Habitat ecology
3. Biomes – Fresh water biomes – lakes and rock pools, springs, steam and rivers; marshes and swamps. Marine biomes – characteristics, and divisions, Pelagic and benthic life, their adaptations; rocky, muddy and sandy stores; estuaries; mangroves. Terrestrial biomes, Soil, forests, grass land, deserts, tundra, tropical rain forests, scrub jungles.

UNIT – V : Applied ecology
1. Natural resources and their management.
2. Aquaculture and fisheries.
3. Forests – Protest action of forests, Chipko movement aorestation, social forests, and biomass production.
5. Environment pollution – Air, water, soil, noise and radioactivity – source, effect and control measures.
6. Green house effect and ozone layer – pesticides and residual effects.

Paper – 11

ANIMAL PHYSIOLOGY

UNIT – I
UNIT – II  : Nutrition & Metabolism
1. Nutrition – Definition, Types – modes of food procurement in animals – Food constituents – protein, carbohydrate, minerals, fat, salt and Vitamins - significance of each food constituents; Balanced diet.
2. Enzymes – general characters, classification and their mode of action – role of inhibitors.
4. Digestion – In man – cellulose digestion absorption and assimilation.

UNIT – III  : Respiration and Excretion
2. Excretion – general organs in mammals formation of nitrogenous wastes – Deamination and ammonotelism, ornithene cycle and ureotelism, citric acid excretion and its significance, structure of human kidney – mechanism of urine formation ; micturition; osmotic and ionic regulations – passive and active transports – osmoregulations in fishes and hormonal control of osmotic balance.

UNIT – IV  : Circulatory system & Nervous System
place during muscle contraction – theories of muscle contraction – muscle twitch, summation, Tetanus, fatigue, electric organs and luminescent organs.

UNIT – V : Thermo regulation and chemical co-ordination

1. Thermo regulation – Temperature relations of homiotherms and poikilothersms – Thermo regulation in man, adaptations met with in animals ride over temperature extreme – Hibernation, Oestivation, diapauses, thermal immigration.

2. Chemical co-ordination – Endocrine organs of man, their secretion and significance – pituitary, thyroid, parathyroid, Adrenal, Pancreas, thymus, pineal body, hypothalamus, gastro intestinal hormones – feedback mechanisms – hormones of moulting ad metamorphosis of insects - Role of endocrines in reproduction, Bioluminescence and its significance, biorhythms in animals.

References:
2. Processor, CL Comparative Animal Physiology. Saunders
5. Verma,PS 7 Tyagi, BS Animal Physical 6/oS. Chand 7 co ,,
6. Agarwal, Vk, agarwal RA Srivatsava, Ak & Kaushal Kumar, Animal Physiology and Biochemistry S.Chand & Co.,

Paper – 12

CELL BIOLOGY AND GENETICS

UNIT – I


UNIT – II


UNIT – III


Genetics

UNIT – IV


UNIT – V

Experimental genetics and population genetics – Hardy Weinberg law – microbial genetics – conjugation, transduction & transformation – Genetic engineering and Biotechnology.
UNIT – I


UNIT – II


UNIT – III

Theories and concepts of evolution – Theories of Lamark, Darwin, and Devries – New Lamarckism and Neo Darwinism.

UNIT – IV

Modes of evolution
1. Evolution in man – biological and cultural evolution – fossils history of man, human races and their distribution
3. Distribution of animals – Zoo geographical realms.

UNIT – V


Practical – III Practicals covered in the subjects EMBRYOLOGY AND ECOLOGY

EMBRYOLOGY
Study of the prepared slides, museum specimens and materials of the

1. Sections of testis and ovary showing the maturation stages of gametes.
2. Slides of mammalian sperm and ovum.
4. Slides of cleavages stages of eggs of Frog and Chick.
5. Slides of blastula and gastrula of Frog and Chick.
6. Slides of different developmental stages of chick embryos.
7. Slides of different stages of brain, heart and eye in chick embryo.
8. Placenta of sheep or pig or rat.

ECOLOGY

1. Estimation of dissolved Oxygen, Salinity, pH, free CO₂ in aquatic environment.
4. Adaptations in aquatic and terrestrial animals based on the study of museum specimens such as rocky and sandy shore animals, planktonic and Benthic animals – Flying and burrowing animals.
5. Visit to near by wild life sanctuary or national park or bioreserve or marine – Practical record and field report should be submitted.

Practical – IV

Practicals covered in the subjects ANIMAL PHYSIOLOGY, CELL BIOLOGY, GENETICS AND EVOLUTION

ANIMAL PHYSIOLOGY

1. Study of digestive enzymes in cockroach.
2. Detection of nitrogenous waste in fish tank water, bird excretes and mammalian urine.
3. Study of blood pressure.
4. Study of Hemoglobin concentration.
5. Use of kymograph unit.
CYTOLOGY
1. Use of microscopes- Camera Lucida, stage and ocular micrometers.
2. Counting of RBC and WBC using hemocytometer.
4. Study of meiotic division using insect testis.
5. Study of prepared slides of different tissues.

GENETICS
1. Observation of common mutants of drosophila.
2. Preparation of mounts of the salivary gland chromosomes of drosophila.
3. Human blood grouping.

Evolution : 1. Study of fossil evidences.(Spotters)
B.Sc. Zoology: Basic Details. In simple terms, Zoology deals with the study of animal science. It is the branch of biology that studies the animal kingdom. Zoology is a very vast field and comprises of the following areas of study: embryology, evolution, classification, habits, habitats, distribution, body structure and their interaction with ecosystems. B.Sc. Zoology graduates have diverse job opportunities available in front of them. They have access to both Government and Private sector jobs.