

B.Sc. Part I Examination, 2015
ZOOLOGY

THEORY

		Max. Marks
		(Min. Pass Marks: 54)
Paper I	: Animal Diversity and Evolution	50
Paper II	: Biology of Non chordates	50
Paper III	: Cell Biology and Genetics	50

PRACTICALS: Max. Marks 75
(Min Pass Marks: 27)

Duration of each theory paper 3 hours
Duration of practical examination 5 hours

Note: Each theory paper is divided in three parts i.e. Section-A, Section –B and Section –C.

Section-A: Will consist of 10 compulsory questions. There will be two questions from each unit and answer of each question shall be limited up to 30 words. Each question will carry of 1 mark.

Section –B: Will consist of 10 questions. Each unit will be having two questions; students will answer one question from each Unit. Answer of each question shall be limited up to 250 words. Each question carries 3.5 Marks.

Section-C: will consist of total 05 questions. Students will answer any 03 questions and answer of each question shall be limited up to 500 words. Each question carries 7.5 Marks.

PAPER I

Animal Diversity and Evolution

Functional morphology of the types included with special emphasis on the adaptations to their modes of life and environment. General characters and classifications of all invertebrate phyla up to class with examples emphasizing their biodiversity, economic importance and conservation measures where required.

Unit 1: General principles of taxonomy, concept of the five-kingdom, Concept of Protozoa, Metazoa and Levels of organization. Basis of classification of non

chordata: Symmetry, coelom, segmentation and embryogeny, Characters and Classification of Protozoa and Porifera upto classes with examples.

- Unit 2: Salient features and classification of Coelenterata, Ctenophora, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata with their suitable examples.
- Unit 3: Origin of Life, Miller's experiment, Lamarckism and Darwinism, Natural Selection, genetic basis of evolution, speciation, Evidences of organic evolution.
- Unit 4: Variations, Isolation and Adaptations, Geological time scale and animal distribution in different era.
- Unit 5: Principal zoogeographical regions of the world with special reference to their mammalian fauna, Factors affecting the large scale animal distribution, Origin and evolution of man.

PAPER II

Biology of Nonchordates

- Unit 1 : *Euglena*: Ultrastructure of flagellum and flagellar movement, osmoregulation and behaviour, reproduction.
Paramecium: Locomotion, nutrition, osmoregulation and reproduction.
Sycon: Cellular organization, canal system, reproduction and development.
- Unit 2 : *Obelia*: Structure of polyp and medusa, sense organs and reproductive systems, life cycle.
Fasciola: Digestive, excretory and reproductive systems, developmental stages and life cycle.
Taenia: Structure of body wall, excretory and nervous systems, reproduction and developmental stages in life cycle.
- Unit 3 : *Nereis*: Parapodial locomotion, digestive, blood vascular, excretory, nervous and reproductive systems, development and metamorphosis.
Hirudinaria: Digestive, haemocoelomic, excretory, nervous and reproductive systems, sense organs.
- Unit 4 : *Palaemon*: Appendages, Digestive, respiratory, blood – vascular, excretory, nervous, sense organs and reproductive systems.

Pila: Digestive, respiratory, blood vascular, nervous and reproductive systems, sense organs

Unit 5 : *Lamellidens*: Digestive, respiratory, blood-vascular, excretory and nervous systems, sense organs, reproduction and development.

Asterias: Water – vascular system, digestive, circulating and nervous systems, sense organs, reproduction, life history and regeneration.

PAPER III

Cell Biology and Genetics

Unit 1: Characteristics of prokaryotic and eukaryotic cells, Characteristics of cell membrane molecules, fluid-mosaic models of Singer and Nicolson, passive and active transport, Structures and functions of endoplasmic reticulum, ribosome, Golgi complex, lysosome, mitochondria, centriole, microtubules and nucleus.

Unit 2: Structure of Chromatin and Chromosomes, semiconservative mechanism of replication, elementary idea about topoisomerases, replication forks, leading and lagging strands, RNA primers and Okazaki fragments, RNA structure and types, mechanism of transcription, Genetic Code and protein synthesis.

Unit 3: Interphase nucleus and cell-cycle including regulation.
Mitosis: Phases and process of mitosis, structure and function of spindle apparatus, Theories of cytokinese.
Meiosis: Phases and process of meiosis, synaptonemal complex, formation and fate of chiasmata recombination and significance of crossing over.

Unit 4: Mendelism: Brief history of genetics and Mendel's work: Mendelian laws, their significance and current status, linked gene inheritance.
Chromosomal aberration: Structural - translocation, inversion, deletion and duplication; Numerical - haploidy, diploidy, polyploidy, aneuploidy, euploidy, polysomy and genetic implications.

Unit 5: Genetic interaction: supplementary genes, complementary genes, duplicate genes, multiple gene interaction, ABO blood groups and their genotypes, Multiple alleles.

PRACTICALS

1. Dissections [Major]:
Palaemon: Study of appendages, general anatomy, digestive and nervous systems
Pila: General anatomy and nervous system
Lamellidens / Unio: General anatomy and nervous system
2. Permanent preparations / Minor dissections of the following:
Protozoa: *Paramecium*
Porifera: Sponge spicules, fibres and gemmules
Coelenterata: *Obelia* colony, *Obelia* medusa
Annelida: *Nereis* parapodia
Arthropoda: *Palaemon*: Statocyst and hastate plate along with comb plates, *Cyclops* and *Daphnia*
Mollusca: *Pila*: Gill lamella, radula and L. S. Osphradium, *Lamellidens*: Gill-lamella
3. Identification, systematic position up to order and general study of the following animal forms, microscopic slides / museum specimens:
Protozoa: *Amoeba*, *Entamoeba*, *Euglena*, *Noctiluca*, *Trypanosoma*, *Trichomonas*, *Foraminifera* (Oozes), *Opalina*, *Balantidium*, *Nyctotherus*, *Paramecium*, *Paramecium* binary fission and conjugation and, *Vorticella* [Whole mounts].
Porifera: *Leucosolenia*, *Grantia*, *Scypha*, *Hyalonema*, *Euplectella*, *Spongilla* and *Euspongia*
Coelenterata: *Obelia* (colony and medusa), *Physalia*, *Porpita*, *Aurelia*, *Rhizostoma*, *Alcyonium*, *Corallium*, *Gorgonia*, *Tubipora*, *Pennatulla* and *Madrepora*
Ctenophora: *Beroe*
Platyhelminthes: *Dugesia*, *Fasciola* and *Taenia*
Nematoda: *Ascaris*, *Ancylostoma*, *Dracunculus*, *Wuchereria*, *Trichinella*, *Schistosoma* and *Enterobius*
Annelida: *Nereis*, Phase Heteronereis, *Aphrodite*, *Arenicola*, *Pheretima*, *Pontobdella*, *Branchellion* and *Hirudinaria*
Onychophora: *Peripatus*
Arthropoda : *Limulus*, *Araneus*, *Palamnaeus*, *Apus*, *Lepas*, *Balanus*, *Sacculina*, *Palaemon*, *Lobster*, *Eupagurus*, *Carcinus*, *Lepisma*, *Odontotermes*, *Pediculus*, *Schistocerca*, *Papilio*, *Bombyx*, *Xenopsylla*, *Apis*, *Julus* and *Scolopendra*
Mollusca: *Chiton*, *Dentalium*, *Patella*, *Pila*, *Turbinella*, *Aplysia*, Slug, Snail, *Mytilus*, *Ostrea* (pearl oyster), *Lamellidens*, *Teredo*, *Nautilus*, *Sepia*, *Octopus*
Echinodermata: *Pentaceros*, *Asterias*, *Ophiothrix*, *Echinus*, *Holothuria* and *Antedon*
4. Study of sections, developmental stages and isolated structures from microscopic slides
Porifera: L. S. and T. S. of *Scypha / Grantia*
Coelenterata: *Hydra*, Sections of *Hydra*, Developmental stages of *Aurelia*

Platyhelminthes: Transverse sections of *Dugesia*, *Fasciola* and *Taenia*, mature and gravid proglottids of *Taenia*, developmental stages of *Fasciola* and *Taenia*

Annelida: Transverse sections of *Nereis* and *Hirudinaria*, Trochophore larva of *Nereis*, Parapodium of *Nereis* and *Heteronereis*

Arthropoda: Crustacean larvae (*Nauplius*, *Zoea*, *Megalopa* and *Mysis*), mosquito larva & pupa

Mollusca: Transverse sections of *Lamellidens* and Glochidium larva

Echinodermata: Pedicellariae of Star fish

5. Experimental Zoology:

(i) Test for Protein : Biuret

(ii) Test for Lipids : Sudan IV

(iii) Test for Carbohydrates : Benedict's

(iv) Demonstration of catalase enzyme activity in animal tissue

(v) Living study of *Paramecium*

(vi) Temporary acetocarmine squash preparations and study of chromosomes

Each regular student is required to keep a record of practical work done by him/her duly checked by the teachers which will be submitted at the time of practical examinations.

Distribution of Marks:

Maximum Marks: 75

Minimum Pass Marks: 27

	<u>Regular</u>	<u>Ex.</u>
Dissection [Major]	20	20
Permanent preparation / Minor Dissection (one)	08	10
Spots (seven)	21	21
Experimental Zoology	06	09
Viva-voce	10	15
Practical Record	10	---
Total	75	75

Recommended Books (All latest editions)

1. Prasad, Beni: *Pila*, Lucknow Publishing House, Lucknow.
2. Bhatia, M. L.: *Hirudinaria*, Lucknow Publishing House, Lucknow.
3. De Robertis, E. D. P. and De Robertis, E. M. F.: *Cell and Molecular Biology*, Halt Saunder, Tokyo, Japan.
4. Gardner, E. J.: *Principles of Genetics*, John Wiley & Sons, New York.
5. Kotpal, R. L. : *Invertebrates*, Rastogi Publications, Meerut.
6. Nigam, H. C. : *A University Course in Invertebrate Zoology*, Vol. I, Mc Milan, London.
7. Prasad, S. N. : *Text Book of Invertebrate Zoology*, Kitab Mahal, Allahabad.
8. Patwardhan, S. S. : *Palaemon*, Lucknow Publishing House, Lucknow.
9. Reese, A. M. : *Outlines of Economic Zoology*, Blackiston Co., Philadelphia, U.S.A.
10. Vishwa Nath : *A Text Book of Zoology*, Vol. I, Invertebrate, S. Chand & Co., New Delhi.
11. Rastogi, Veerbala : *Invertebrate Zoology*, Kedar Nath Ram Nath, Delhi.
12. Jordan, E. L. and P. S. Verma: *Invertebrate Zoology*, S. Chand & Co. Ltd., Ram Nagar, New Delhi.
13. Alberts, B. *et.al. The Cell* (Garland).
14. Lodish, H., *et.al. Molecular Cell Biology* (Freeman).
15. Gupta, P. K., Genetics, Rastogi Publications, Meerut.
16. Rastogi, Veer Bala, Cell Biology, Kedar Nath Ram Nath, Delhi.