

MAGADH UNIVERSITY

BODH-GAYA



COURSES OF STUDIES
FOR
B. Sc. HONOURS SUBSIDIARY &
GENERAL Part I, II & III Examination
IN
ZOOLOGY—1998 on Wards

PRICE Rs. 10/-

5

Magadh University, Bodh-Gaya

COURSES OF STUDY

FOR THE

EXAMINATION 1998 Onward

IN

ZOOLOGY

B. Sc. Part I

Subsidiary/General Zoology Paper I (Theory)

Time 3 hrs.

Full marks 75

Five Questions are to be set from each group. Students shall answer five questions attempting not more than three any group.

Group A—Nonchordate

- 1 Bionomics, General characters and classification (up to orders) of the following phyle : Protozoa. Perifera, Coelenterata, Platyhelminthes, Aschelminthes, Anne- lida, Arthropoda, Mollesca. Echinodermata, and Hemichordata.

Detailed study of the stucture and Life history of the following types.

(2)

(i) Protozoa	Paramecium
(ii) Perifera	Sycon
(iii) Cnidaria	Obelia
(iv) Platyhelminthes	Fasciola
(v) Aschelminthes	Ascaris
(vi) Annelida	Pheretima
(vii) Arthropoda	Palaemon
(viii) Mollusca	Pila
(ix) Echinodermata	Asterias
(x) Hemichordata	Balanoglossus

Group B—Cell Biology, Genetics and Evolution.

Cell Biology & Genetics

(i) Gametogenesis, fertilization and Parthenogenesis

(ii) Ultra structure and functions of the following collorganelles :—

Plasma membrane, Endoplasmic reticulum, Mitochondria, Golgibody, Ribosomes, Chromosome, lysosome.

(iii) Structure and function of DNA.

(v) Gene Mutation.

(vi) Linkage & Crossingover.

2 Evolution :

(i) Sources of hereditary variations and their role in evolution.

(3)

(ii) Darwin's theory of Natural selection and Neo-Darwinism.

(iii) Isolating mechanism and their role in Evolution.

(Practical)

Time 3 hours.

Full marks 25

1 Dissection 6

Pheretima : Reproductive system, Nervous system, Alimentary Canal.

Palaemon : Alimentary canal, Nervous system.

Pila : Alimentary canal, Nervous system, Organs of Pallial Complex.

2 Mounting (Permanent stained preparation) 4
Septal nephridia, Ovary, Setae of Earthworm;
Statocyst of Prawn;
Radula and Osphradium of **Pila**.

3 Spotting : 6
(a) Museum specimens 2
(b) Slides 3
(c) Evolution 1

4 Cytology 4
Squash preparation to show stages of Mitosis
(Onion root tips) and Meiosis (Grasshopper testis)

(4)

Or

Identify the giant chromosomes of *Chironomus* / *Drosophila* larvae.

5 Practical records.

5

ZOOLOGY HONOURS PART I

THEORY

PAPER—IA

(Non—chordate)

Time—3 Hours

Full Marks—75

In all ten questions are to be set out of which number 1 and 2 shall consist of objective (1×15 marks) and short answers (3×3) requiring questions respectively and both shall span over the whole syllabus in the paper. Students would be required to answer five questions of which question numbered 1 and 2 shall be compulsory.

I Bionomics, general characters and classification (upto orders) of the following Phyla :

Protozoa, Perifera, Cnidaria, Ctenophora, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca, Echinodermata and Hemichordate.

II Detailed study of the following types :

1 Protozoa—*Paramecium* Parasitic protozoans and their modes of infection *Polystomella* (*Elphidium*)

(5)

- 2 Perifera—*Sycon*, Canal system in sponges, affinities of the phylum.
- 3 Cnidaria—*Obelia*, *Aurelia*, Sea anemone.
- 4 Ctenophora—General organization of *Hormiphora*, affinities of the phylum.
- 5 Platyhelminthes—*Fasciola hepatica*, *Taenia solium* and *Planaria*.
- 6 Aschelminthes—*Ascaris lumbricoides*, *Wuchereria bancrofti*.
- 7 Annelida—*Pheretima posthuma*, Leech, Metamerism in Annelida.
- 8 Arthropoda—*Palaemon*, *peripatus*, Adaptive variations in insect mouth parts, *Sacculina*.
- 9 Ectoprocta—*Bagula*.
- 10 Mollusca—*Unio*, *Pila*, *Sepia*, Torsion and detorsion in Gastropoda.
- 11 Echinodermata—*Asterias*, Larval forms in Echinoderms.
- 12 Hemichordata—*Balanoglossus*.

(6)

PAPER—IIA

Time : 3 Hours.

Full Marks—75

(Ecology, Animal Behavior and Biometry)

I Ecology

- 1 Concept of Biosphere (Lithosphere, hydrosphere and atmosphere).
- 2 Ecosystem—Definition, structure and function of a typical ecosystem, major ecosystems of the world.
- 3 Structure (Abiotic and Biotic) and function (energy flow, Biogeochemical cycles) of freshwater, grass-land, desert, and forest ecosystems.
- 4 Community structure and its ecological succession.
- 5 Pollution and its hazards.
- 6 Wild-life conservation.

II Animal Behaviour.

- 1 Scope of Ethology, Innate and learned behaviour.
- 2 Social behaviour in insects.
- 3 Parental care in fishes and Amphibia.

(7)

- 4 Brooding, nesting and migratory behaviour in birds.
- 5 Concept of Biological clock.

III Biometry.

Scope and application of the following statistical methods in Biology :

- 1 Normal distribution and its attributes range, mode, median and arithmetic mean).
- 2 Standard error, standard deviation. Simple test and Chi-square test.

Zoology Practical

(PAPER—IB and II B)

Time—4 Hours.

Full Marks—50

1 Dissection :

Pheretima, Leech : Alimentary canal, Reproductive, Excretory and Nervous systems.

Palaemon— Alimentary canal, Nervous system.

Unio Pila and Sepia—Nervous system, organs of Pallial complex of Pila.

(8)

2 Permanent stained preparations of the followings :--5

Paramecium, Gemmules, spicules, Obelia colony, Nephridia and ovary of *Pheretima*, jaw of leech, statocyst of prawn, cephtridium, radulla and gill of pila. gill of unio, Glochidium larve, larvae of crustace and Echinoderms, Pedicellaria.

3 Spotting

(Each of two marks) 14

- (i) Museum specimens — 2
(ii) Slides — 4
(iii) Specimens relating animal behaviour or Parental care — 1

4 Ecology 6

- (i) Analysis of soil/pond biota :
(ii) Determination of dissolved oxygen and pH of different water samples.
(iii) Community structure of Grassland.
(iv) Moisture content of soil sample.

5 Biometry 5

Calculation of the arithmetic mean and standard deviation of the samples provided.

6 Record and field work — 5
7 Viva. — 5

(9)

B. Sc. PART—II

SUBSIDIARY/GENERAL ZOOLOGY

PAPER—II A (THEORY.)

Time—3 hrs.

Full marks—75

Five questions are to be set from each group. Students shall answer five questions attempting not more than three from any group.

GROUP—A

Chordata

- 1 **Bionomica, General Characters and Classification** (up to orders only) of living chordates of the Following groups; Protochordata, Cyclostomata, Pisces, Amphibia, Reptilia, Aves and Mammalia.
- 2 Study of the following types :—
 - (i) Urochordata—**Herdmania** (including reterogressive metamorphosis).
 - (ii) Cephalochordata—**Amphioxus**.
 - (iii) Fishes—**Scoliodon**—Type study : differences with that of a Bony fish.
 - (iv) Reptilia—**Bitting & feeding mechanism of Snakes**
 - (v) Aves—**Columa**—Flight adaptation, elementary ides of bird migration & Santuaries of India.
 - (vi) Mammals—**Characters, distribution and affinities of Prototheria & Metatheria.**

3 Comparative study of the following in Vertebrates:
Intequment, Heart, Aortic Arches and Brain.

GROUP—B

Embryology

(i) Types of vertebrate eggs and their early cleavage.

(ii) Development of Amphioxus (Up to the formation of Coelom) and chick (up to 3 germ layers)

(iii) Placenta in Mammals—their development, Types and functions.

Biochemistry, Physiology and Endocrinology.

(i) Structure and classification of Protein, Carbohydrate & fats.

(ii) Physiology of Digestion, Excretion and Respiration in mammals.

(iii) Histophysiology of the following Endocrine glands in mammals : Islets of Langerhans, Testis, Ovary, Thyroid, Adrenal & Pituitary.

Paper II B (Practical)

Time—3 hrs.

Full Marks—25

1 Dissection :

7

Scoliodon—Afferent and efferent branchial arteries, Cranial nerves (V, VII) and (IX, X) Internal ear, eye muscles & their nerves supply, Urinogenital system.

Columba—Flight muscles, Arterial and Venous system

2 Mounting Permanent stained preparation) 4

Scales of fishes Pecten and Filoplume feather of birds, Ampulla of Lorenzini.

3 Spotting. 6

Museum specimen—1

Bones —3

(Limb) Girdle, Skull, vertebrae of varanus and fowl)

4 Slides —1

(Endocrinology & Embryology) 2×2=4

(i) Identification of permanent slides of the various developmental stages of Frog and Chick.

(ii) Identification and comment upon the histological structure of various Endocrine glands.

5 Practical Records. 4

B. Sc. Honours Part II

Zoology Theory

PAPER—III

1 Origin and evolution of chordates.

- 2 Binomials, General Characters and classification of the chordates (upto order) of the following groups : Protochordata, Cyclostomata, Pisces, Amphibia, Reptilia, Aves and Mammalia.
- 3 Study of the following types :
- (a) Urochordata : General organisation and life cycle of Herdmania and Salpa.
 - (b) Cephalochordata : Amphioxus
 - (c) Cyclostomata : Petromyzon
 - (d) Fishes : (i) Labeo or any bony fish, scoliodon.
(ii) Distribution, general organisation and affinities of Dipnoi; Accessory respiratory organs in fishes.
 - (e) Amphibia : (i) Origin & evolution of Amphibia; Neoteny.
 - (f) Reptilia : Any lizard; Biting and feeding mechanism in snakes.
 - (g) Aves : (i) Columba; Origin of Birds; Flight adaptations,
 - (h) Mammalia : (i) Characters, distribution and affinities of Prototheria & Metatheria,
(ii) General organisation of Primates.

Note :—In all ten questions are to be set out of which number 1 and 2 shall consist of objective (1×15 marks) and short answers (3×5) requiring questions respectively and both shall span over the whole syllabus in the paper. Students would be required to answer five questions of which question numbered 1 and 2 shall be compulsory.

HONOURS PART—II

ZOOLOGY THEORY

PAPER—IV

(Comparative vertebrate Anatomy and Embryology)

Time—3 Hours

Full Marks—75

Comparative Anatomy

Study of the following organ-systems in major vertebrate groups :

- (i) Integument; its derivatives and function.
- (ii) Gastrointestinal tract.
- (iii) Respiratory system.
- (iv) Heart, Aortic arches.
- (v) Brain.

(vi) Evolution and fate of kidney, urinogenital ducts, gonads.

(vii) Evolution of chondria—Splanchno- & osteocranium.

Embryology.

(i) Fertilization.

(ii) Types of vertebrate eggs cleavage patterns.

(iii) Development of *Amphioxus* (upto the formation of coelome).

(iv) Development of chick (upto 3 germinal layers)

(v) Development and functions of extra-embryonic membranes in chick.

(vi) Placenta in mammals-its development, types and functions.

(vii) Organogenesis of Heart, Brain and Eye in Chick embryo.

B. Sc. HONOURS PART—II

ZOOLOGY PRACTICAL

(PAPER III B & IV B)

Full Marks—50

Time—6 hours

1 Dissections: 10

(i) *Scoliodon* and any Bony fish: Afferent and efferent branchial vessel: V, VII, IX, X) cranial nerves: Eye muscles and their nerve supply. Internal ear: accessory respiratory organs.

(ii) Frog—Cranial nerves V; VII, IX, X)

(iii) Lizard—Arterial and Venous system.

(iv) Pigeon—Arterial and venous systems, air sacs, flight [muscles] with the origin and insertion of tendons.

(v) Mammals—Neck nerve, Urino-genital organs.

2 Mounting 5

Velum and Oral hood of *Amphioxus*, Ampulla of Lorenzini respiratory membrane of air, breathing-structures, scales of fishes, pecten and feathers, Mounting of chick embryo (24 and 48 hours).

3 Permanent stained preparation of paraffin sections provided. 5

4 Spotting: 20

(i) Museum specimens— 2

(ii) Slides—Histology & Embryology—4

(iii) Bones Limbs—	1
of Frog Girdles—	1
Skull—	1
Varanus Vertebrae—	1
Fowl & Rabbit	
5 Record and field work	5
6 Viva	5

ZOOLOGY Honours Part III

Zoology Theory

PAPER—V

Time 3 hrs.

Full Marks 100

Biochemistry, Physiology & Endocrinology.

Biochemistry :

- i) Structure and classification of Protein, Carbohydrate & fats.
- ii) Structure and classification of Aminoacids.
- iii) Metabolism of Carbohydrate Glycolysis,—Glycogenesis, and Krebs's cycle.
- iv) Beta oxidation of fatty acids.
- v) Vitamins—Definition, Types and functions.
- vi) Ph, buffers and electrolyte dissociation.

Physiology (Mammals) :

- 1 Physiology of digestion.
- 2 Physiology of Respiration (Ventilation of lungs and transport of gases).
- 3 Physiology of excretion and Osmoregulation.
- 4 Physiology of Blood coagulation.
- 5 Mechanism of thermoregulation.
- 6 Acid base balance.
- 7 Physiology of Vision and Hearing.

Endocrinology (Mammal) :

- 1 Histo-physiology of the various endocrine glands.
- 2 Chemical nature and physiological actions of the hormones secreted by Adenohypophysis. Neurohypophysis Adrenal, thyroid, Islets of Langerhans and Gonads.

Note : In all ten questions are to be set out of which numbers 1 and 2 shall consist of objective (1 X 15 marks) and short answers (3 X 5) requiring question respectively and both shall span over the whole syllabus in the paper. Students would be required to answer five questions, of which question numbered 1 and 2 shall be compulsory.

(18)

PAPER—VI

Time 3 hrs.

Full marks 100

(Cell Biology, Genetics and Economic Zoology).

Cell Biology :

- 1 Ultrastructure & function of the following cell organism—Plasma membrane, mitochondria & golgi complex.
- 2 Gametogenesis, fertilization and Parthenogenesis.
- 3 Ribosome & Protein synthesis.
- 4 Genetic code, Transcription & Translation.
- 5 Chromosomes & Giant chromosomes.
- 6 Active transport across cell membrane.

Genetics :

- i) Linkage and crossingover.
- ii) Structure and Replication of DNA; transcription and translation.
- iii) Chromosomal aberrations—the genetic and cytological manifestations and significance.
- iv) Gene mutation and molecular mechanism of its origin.

(19)

v) Extra-nuclear genetic system.

vi) Eugenics.

ECONOMIC ZOOLOGY :

i) Lac Culture

ii) Sericulture

iii) Apiculture

iv) Pisciculture

v) Elementary idea of the common pests of paddy, wheat, sugarcane and vegetables, their control.

vi) Vectors of kalazar, malaria, and Falaria, their Biology mode of infection, prevention and control

vii) Wild-life conservation.

Note : In all ten question are to be set out of which number 1 and 2 shall consist of objective (1×15 marks) and short answers (3×5) requiring questions respectively and both small span over the whole syllabus in the paper. Students would be required to answer five question, of which question numbered 1 and 2 shall be compulsory.

PAPER—VII

Time—3 hours.

Full Marks 100

(Evolution, Zoogeography & Paleozoology).

Evolution :

- i) Sources of hereditary variations and their role in evolution.
- ii) Principles of evolution; Lamarkism, Neo-Lamar-kism., Darwinism & Neo-Darwinism.
- iii) Isolating mechanisms and their role in evolution.
- iv) Mimicry and colouration.
- v) Fossil history of Horse & Man.

Zoogeography and Paieozoology :

- i) Zoogeographical realms of the world-their boun-daries and climatic peculiarities.
- ii) Characteristic & Peculiar fauna of Oriental Etho-pian and Australian regions.
- iii) Characteristics of Island fauna.
- iv) Theories & Principles pertaining to animal distri-bution.
- (v) Different geological eras of the world, their duration and climatic conditions.
- (vi) Faunistic Peculiarities of Paleozoic, Mesozoic and Cenozoic eras.

- (vii) Fossils, their mode of formation & age determi-nation.

Note :—In all ten questions are to be set out of which number 1 and 2 shall consist of objective (1×15) marks and short answers (3×5) requiring ques-tions respectively and both shall span over the whole syllabus in the paper. Students would be required to answer five questions, of which question numbered 1 and 2 shall be compulsory.

PAPER—VIII A (Practical)

(Biochemistry, Physiology & Endocrinology)

Time—6 hrs.

Full Marks—50

- | | |
|--|----|
| 1 Biochemistry | 10 |
| 1 Benedicts test for reducing sugar | |
| 2 Molisch's test | |
| 3 Iodine test for starch and glycogen | |
| 4 Ninhydrin reaction for glycine/tyrosine/trypto-phan. | |
| 5 Millan's reaction for glycine/tyrosine/phenylela-nine. | |
| 2 Physiology—experiments to be performed in frog/bird/mammal (Two experiments each of 7 marks) 7×7 | |
| 1 Enumeration of total RBC. | |

- 2 Estimation of haemoglobine (gm/100ml) in blood.
 - 3 Determination of ESR of blood.
 - 4 Determination of bleeding and clotting time.
 - 5 Determination of O₂ uptake by terrestrial animal.
 - 6 Simple heart-beat and muscle curve by drum method.
- 3 Dissection and display of any four the following endocrine glands in a mammal-gonad, thyroid, adrenal, Pancreas.
- 4 Identification and comment upon the histological slides (four in number) of the following :
- Pituitary, Adrenal, Ovary, Testes, Islets of Langerhans, Thymus, Thyroid, Parathyroid and Vaginal smears.
- 5 Practical records. 5
 - 6 Viva 5

PAPER—VIII B

Time—6 Hours Full Marks—50

(Cell Biology, Genetics, Paleozoology and Evolution)

Cell Biology 10

- 1 Vital staining of secretory granules in Salivary glands of Cockroach and Mitochondria in the buccal epithelium.

Genetics

- 1 Acetocarmine stained squash preparation of the onion root tips and testes of gresshopper to demonstrate stages of mitotic and meiotic divisions respectively.
- 2 Acetocarmine preparation of the giant chromosomes of the chironomus/Drosophila larvae.

Evolution and Paleontology

- 1 Serial homology is exhibited by the appendages of prawn.
- 2 Homology and Analogy as exhibited by the wings of birds, bat and insect.
- 3 Adaptive radiation as exhibited by beaks of birds and dentition of mammals.
- 4 Study of Fossils.

Identification and comments upon the specimens/slides on Economic Zoology (3) and Cytology (2)

Practical Record 5

Viva 5

GENERAL ZOOLOGY

Paper III A (Theory)

Time—3 Hrs.

Full Marks—75

Five questions are to be set from each group. Students shall answer five questions attempting not more than three from any group.

Group—A

Ecology :

- 1 Concept of Biosphere, 2. Definitions structure and functions of a typical ecosystem; 3 Major Ecosystems of the world and their features 4. Pond ecosystem, and Forest ecosystem, 5. Physical and Biotic factors; 6. Biogeochemical Cycles of Oxygen, Nitrogen and Carbon; 7. Energy flow in Ecosystems.

Animal Behaviour.

- i) Scope of Ethology; Innate and Learned Behaviour.
- ii) Parental care in fishes and Amphibias.
- iii) Social Behaviour in insects.
- iv) Migratory behaviour in birds.

GROUP—B

Palaeozoology and Zoogeography.

- i) Different geological eras of the world, their climatic conditions and fauna.

- ii) Zoogeographical realms of the world and their boundaries.
- iii) Biogeographical distribution of animals in Oriental, Ethiopian and Ausfralian regions .
- iv) Fossils and their mode of formation.

Economic Zoology.

- i) Sericulture-Lac Culture and Pisciculture.
- ii) Preliminary idea of the common pests of Paddy & Wheat, their control.
- iii) Vectors of Kalazar, Malaria, Filaria-their prevention and control.

General Zoology Paper III B (Practical)

Ecology, Animal [Behaviour, Palaeozoology, Zoogeography & Economic Zoology.

Time—3 hrs.

Full Mark—25

- 1 Quantitative estimation of dissolved O₂ in water with the help of winkler's volumetric method.
- 2 Determination of PH of different water samples. 3
- 3 Moisture content of soil, identification and comment on the organisms present in water/soil samples. 5
- 4 Identification and comment on the specimens (spotting) on. 6

- i) Palaeozoology—Fossils.
- ii) Economic zoology—silk yarn, Larva, Pupa Adults of silk worm;

Lac sticks, Lac insect, fishing gears, Museum specimens showing parental care; Mouth parts of male and female Culex, Anopheles. Sand fly and their different development stages.

5 Practical records.

5

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