

MARWARI COLLEGE, RANCHI
(AN AUTONOMOUS UNIT OF RANCHI UNIVERSITY FROM 2009)



DEPARTMENT OF ZOOLOGY

COURSES OF STUDY FOR ZOOLOGY SUBSIDIARY

Number of Papers: 8

(4 Theory papers & 4 Practical Papers)

Full Marks: 400

Number of Semesters: 4

B. Sc. Subs. Part – I: 200 Marks

B. Sc. Subs. Part – II: 200 Marks

Zoology Syllabus for Subsidiary

Marwari College, Ranchi

SEMESTER	PAPER	FULL MARKS	PASS MARKS	DURATION
I, II, III & IV	Theory	75	25	3 Hrs.
	Practical	25	10	3 Hrs.

Semester - I
Paper – 1, (23 classes)
Instructions to Paper Setters
Full Marks: 75

Paper setters shall set questions in three groups.

- Group A.** Shall contain multiple choice questions, fill in the blanks and true / false type questions – Twenty questions of one mark each (20 x 1 = 20)
- Group B.** Shall contain concept based questions – Five questions of two marks each (5 x 2 = 10)
- Group C.** Long answer questions – Three questions of fifteen marks each (3 x 15 = 45)
 Altogether 5 questions have to be answered, where Groups A and B shall be compulsory.

Full Marks: 75

Pass Marks: 25

Non-chordates (Protozoa to Annelida):

1. Bionomics, general character and classification (up to orders) of the following phyla: (2)
 Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata.
2. Detailed study of the structure and life-history of the following Types: (12)
 - a) Protozoa : *Paramecium*
 - b) Porifera : *Sycon*
 - c) Coelenterata : *Obelia*
 - d) Platyhelminthes : *Fasciola*
 - e) Aschelminthes : *Ascaris*
 - f) Annelida : *Pheretima*

Ecology:

- a) Concept of biosphere
- b) Definition, structure, and Function of a typical Ecosystem
- c) Major Ecosystems of the world and their features
- d) Pond Ecosystem and Forest Ecosystem
- e) Physical and Biotic factors
- f) Biogeochemical cycles: Oxygen, Nitrogen and Carbon cycle.
- g) Energy flow in Ecosystems

Books Recommended

Non-chordates:

1. Jordan &. Verma Invertebrate Zoology S. Chand & Co. Ltd. New Delhi
2. Kotpal, R.L. Modern Text Book of Zoology INVERTEBRATES Rastogi Publications, Meerut

Ecology:

1. Dash, M.C. Fundamentals of Ecology Tata McGraw-Hill New Delhi
2. Mukharjee, B. Fundamentals of Environmental Biology Silver Line Publications ND, Patna
3. Mukherjee, B. Environmental Management Vikas
4. Sharma, P.D. Ecology & Environment Rastogi Publications, Meerut
5. Singh, H.R. Environmental Biology S. Chand & Co. Ltd. New Delhi
6. Verma & Sharma Ecology & Animal Behaviour Jaiprakash Nath & Co. Meerut

Evolution:

1. Ayodhya Prasad Scientific Refresher Course in Zoology Paper – VII Evolution,
 Palaeontology & Zoogeography & Embryology Scientific Book Company Patna
2. Moody Introduction to Evolution
3. Savage Evolution (Holt, Reinhart and Winston)

B.Sc. Part - I
Semester - I
Paper – 2 (Practicals) (5 classes)

Full marks: 25

Time: 3 Hrs.

Pass marks: 10

- 1. Dissection:** (6 marks)
Pheretima: Alimentary canal, Reproductive and Nervous system.
- 2. Mounting: temporary stained preparation** (4 marks)
Septal nephridia, Ovary and Setae of earthworm
- 3. Spotting:** (8 marks)
(a) 4 slides from non-chordates: Paramecium, Hydra WM, Obelia WM,
TS of earthworm through typhlosolar region, spermatheca WM.
(b) 4 museum specimens: Sycon, Fasciola, Taenia, Ascaris male & female,
Aphrodite.
- 3. Practical record and fieldwork:** (4 marks)
- 4. Viva –voce:** (3 marks)

B.Sc. Part - I
Semester - II
Paper – 3 (17 classes)
Instructions to Paper Setters
Full Marks: 75

Paper setters shall set questions in three groups.

- Group A.** Shall contain multiple choice questions, fill in the blanks and true / false type questions – Twenty questions of one mark each (20 x 1 = 20)
- Group B.** Shall contain concept based questions – Five questions of two marks each (5 x 2 = 10)
- Group C.** Long answer questions – Three questions of fifteen marks each (3 x 15 = 45)

Altogether 5 questions have to be answered, where Groups A and B shall be compulsory.

Full marks: 75

Pass marks = 25

Non-chordates (Arthropoda to Hemichordata):

- a) Arthropoda : *Palaemon*
b) Mollusca : *Pila*
c) Echinodermata : *Asterias*
d) Hemichordata : *Balanoglossus.*

Cell Biology & Genetics:

- a) Gametogenesis, fertilization and parthenogenesis
b) Structure and function of DNA
c) Replication of DNA
d) Gene mutation
e) Linkage and Crossing-over

Evolution:

- a) Sources of hereditary variations and their role in evolution.
b) Darwin's theory of Natural Selection and Neo-Darwinism.
c) Isolating mechanisms and their role in evolution.

Books Recommended

Non-chordates:

1. Jordan & P.S. Verma Invertebrate Zoology S. Chand & Co. Ltd. New Delhi
2. Kotpal , R.L. Modern Text Book of Zoology INVERTEBRATES Rastogi Publications, Meerut

Cell Biology:

1. Agarwal, V.K. Cell Biology S. Chand & Co Ltd. New Delhi
2. Ayodhya Prasad Scientific Refresher Course in Zoology Paper – VI Cell Biology, Genetics & Economic Zoology Scientific Book Company Patna
3. Dalela & Verma A Textbook of Cytology Jaiprakash Nath & Co Meerut Delhi
4. Gupta, P.K. Cytology Genetics & Evolution Rastogi Publications New
5. Singh & Tomar Cell Biology Rastogi Publications Meerut

Evolution:

1. Ayodhya Prasad Scientific Refresher Course in Zoology Paper – VII Evolution, Palaeontology & Zoogeography & Embryology Scientific Book Company Patna
2. Moody Introduction to Evolution
3. Savage Evolution (Holt, Reinhart and Winston)

B.Sc. Part - I

Semester - II

Paper – 4 (Practicals) (8 classes)

Full marks: 25

Time: 3 Hrs.

Pass marks: 10

1. Dissection:

(6 marks)

Cockroach: Reproductive & Nervous systems.

Prawn: Digestive & Nervous systems.

Pila: Nervous system.

2. Mounting: temporary stained preparation

(4 marks)

Osphradium of Pila, Mouth parts of cockroach, statocyst of prawn, Baar body from buccal epithelium of female human.

3. Spotting

(8 marks)

a) 4 slides from non-chordates and cytology: Appendages of prawn, Salivary glands of cockroach, Giant chromosome of Drosophila, Mitotic stages in onion root tips.

b) 4 museum specimens: Crab, Hermit crab, Nautilus, Aplysia, Unio, Sepia, Sea urchin, Antedon, Asterias, Balanoglossus.

4. Practical record and fieldwork

(4 marks)

5. Viva –voce

(3 marks)

B.Sc. Part - II
Semester - III
Paper – 5 (21 classes)
Instructions to Paper Setters
Full Marks: 75

Paper setters shall set questions in three groups.

- Group A.** Shall contain multiple choice questions, fill in the blanks and true / false type questions – Twenty questions of one mark each (20 x 1 = 20)
- Group B.** Shall contain concept based questions – Five questions of two marks each (5 x 2 = 10)
- Group C.** Long answer questions – Three questions of fifteen marks each (3 x 15 = 45)
 Altogether 5 questions have to be answered, where Groups A and B shall be compulsory.

Full marks: 75

Pass marks = 25

Chordates (up to Fishes):

1. Bionomics, general character and classification (up to orders) of living chordates of the following groups: Protochordates, Cyclostomes, Pisces, Amphibia, Reptilia, Aves and Mammals. (6)
2. Study of the following types: (7)
 - a) Urochordata : *Herdmania* (including retrogressive metamorphosis)
 - b) Cephalochordata : *Amphioxus*
 - c) Fishes : *Scoliodon*, pisciculture
 - d) Amphibia : Parental care
 - e) Reptilia : Distinction between poisonous and non-poisonous snakes.

Animal Behaviour: (6)

- a) Scope of ethology: Innate and Learned behaviour
- b) Parental care in Fishes and Amphibians
- c) Social behaviour in Insects
- d) Migratory behaviour in birds

Economic Zoology: (2)

- a) Sericulture
- b) Lac culture

Books Recommended

Chordates:

1. Kotpal, R.L. Textbook of Zoology VERTEBRATES Rastogi Publications,
2. Kulashreshtha, S.K. Comparative Anatomy of Vertebrates Anmol Publications Meerut
3. Nigam, H.C. Biology of Chordates Vishal Publishing Co. Jalandhar. Pvt. Ltd. New Delhi

Animal Behaviour:

1. Hoshang S. Gundevia & Hare Govind Singh Animal Behaviour S. Chand & Co. Ltd. New Delhi
2. Manning & Dawkins Animal Behaviour Cambridge Low Price Edition
3. Rina Mathur Animal Behaviour Rastogi Publications, Meerut

Economic Zoology:

1. Jawed .& Sinha A handbook of Economic Zoology S. Cand & Co. Ltd. New Delhi
2. Shukla & Upadhyay Economic Zoology Rastogi Publications New Delhi

Semester - III

Paper – 6 (Practicals) (8 classes)

Full marks: 25

Time: 3 Hrs.

Pass marks: 10

4. Dissection:

(6 marks)

Scoliodon: Afferent & efferent branchial arteries, Cranial nerves – 5th, 7th, 9th and 10th.

5. Mounting: temporary stained preparation

(4 marks)

Placoid scales, ampullae of Lorenzini, scales of bony fishes.

6. Spotting

(8 marks)

c) 4 slides from chordates: TS of stomach, intestine, liver, pancreas, testis, ovary of Frog

d) 2 museum specimens: Herdmania, Amphioxus, Torpedo, Sting ray, Anabas, Clarias, Catla, Tree frog, Bull frog, Calotes, Cobra, Krait.

e) 2 specimens from economic Zoology/ animal behaviour: Lac stick, cocoon of silk worm, termite mound.

6. Practical record and fieldwork

(4 marks)

7. Viva –voce

(3 marks)

B.Sc. Part - II
Semester - IV
Paper – 7 (21 classes)
Instructions to Paper Setters
Full Marks: 75

Paper setters shall set questions in three groups.

- Group A.** Shall contain multiple choice questions, fill in the blanks and true / false type questions – Twenty questions of one mark each (20 x 1 = 20)
- Group B.** Shall contain concept based questions – Five questions of two marks each (5 x 2 = 10)
- Group C.** Long answer questions – Three questions of fifteen marks each (3 x 15 = 45)
Altogether 5 questions have to be answered, where Groups A and B shall be compulsory.

Full marks: 75

Pass marks = 25

Chordates (Birds to Mammals & Comp. anatomy): **(6)**

1. Aves: *Columba*, flight adaptation
2. Mammals: Characters, distribution and affinities of Prototheria and metatheria.
3. Comparative study of the following organs: Brain and aortic arches in vertebrates.

Embryology: **(4)**

1. Types of vertebrate eggs and their early cleavage.
2. Development of *Amphioxus* (up to formation of coelom) and Chick (up to 3 germinal layers).
3. Placenta in mammals, its development, Types and Functions.

Biochemistry:

(3)

Structure and classification of: Proteins, Carbohydrates and Fats.

Physiology of mammals: Digestion, Excretion and Respiration. **(3)**

Endocrinology: **(5)**

Histophysiology of the following endocrine glands: Pituitary, Thyroid, Adrenal, gonads, and Islets of Langerhans.

Books Recommended

Chordates:

1. Kotpal, R.L. Textbook of Zoology VERTEBRATES Rastogi Publications, Meerut
4. Nigam, H.C. Biology of Chordates Vishal Publishing Co. Jalandhar. Pvt. Ltd. New Delhi
2. Kulashreshtha, S.K. Comparative Anatomy of Vertebrates Anmol Publications Pvt. Ltd. New Delhi

Embryology:

1. Bradley M. Patten Early Embryology of the chick TMH Mumbai, ND
2. Dalela & Verma Chordate Embryology Jaiprakash Nath & Co. Meerut
3. Sandhu, Srivastava & Arora Embryology Anmol Publications Pvt. Ltd. New Delhi
4. Sastry & Shukla Developmental Biology Rastogi Publications, Meerut

Biochemistry:

1. Srivastava, H.S. Elements of Biochemistry Rastogi Publications, Meerut
2. Ayodhya Prasad Scientific Refresher Course in Zoology Paper – V Biochemistry, Physiology & Endocrinology Scientific Book Company Patna
3. Cantrow Biochemistry

Physiology:

1. Berry, A.K. Animal Physiology Emkay Publications Delhi
2. Goel & Sastri Animal Physiology Rastogi Publications, Meerut

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3. Gupta, P.K. Animal Physiology
4. Singh & Kumar Animal Physiology & Biochemistry Vishal Publishing Co. Jalandhar
5. Thakur & Puranik Mammalian Physiology S. Chand & Co. Ltd. New Delhi

Endocrinology:

1. Ayodhya Prasad Scientific Refresher Course in Zoology Paper – V Biochemistry, Physiology & Endocrinology Scientific Book Company Patna
2. Hadley Endocrinology
3. Noris Vertebrate Endocrinology

B.Sc. Part - II

Semester - IV

Paper – 8 (Practicals) (6 classes)

Full marks: 25

Time: 3 Hrs.

**Pass marks: 10
(6 marks)**

1. Dissection:

Rat / Squirrel: Reproductive system and endocrine glands.

2. Biochemical tests:

(4 marks)

a) Carbohydrates

b) Proteins

c) Fats

3. Spotting

(8 marks)

a) 2 slides from histology of chordates: TS of stomach, intestine and liver of a mammal.

b) 2 slides from frog & chick embryology: VS of blastula, gastrula and tadpole of Frog; different incubation hours of chick embryos.

c) 2 slides from endocrinology: CS of pancreas, adrenal, pituitary, thyroid, testis and ovary of a mammal.

d) 2 museum specimens: Crow, fowl, koel, woodpecker, echidna, bat, rat.

4. Practical record and fieldwork

(4 marks)

5. Viva –voce

(3 marks)