

## SYLLABUS

### B.Sc. (Zoology) Part-II (Semester-III and IV) (Session 2019-20 & 2020-21)

#### Semester-III

<b>THEORY</b>		
	<b>External Marks</b>	<b>Internal Assessment</b>
<b>Paper-I : Chordates-I</b>	40	15 (Attendance: 3 + Assignment: 6 + House Test 6)
<b>Paper-II : Chordates-II &amp; Evolution</b>	40	15 (Attendance: 3 + Assignment: 6 + House Test 6)

#### PRACTICAL

Pertaining to Theory Paper-I and Theory Paper-II:

40

#### Total Marks (Semester-III)

Theory	80 Marks
Practical	40 Marks
Internal Assessment pertaining to Theory Paper I & II	30 Marks
<b>Total</b>	<b>: 150 Marks</b>

#### Semester-IV

<b>THEORY</b>		
	<b>External Marks</b>	<b>Internal Assessment</b>
<b>Paper-I : Biochemistry</b>	40	15 (Attendance: 3 + Assignment: 6 + House Test 6)
<b>Paper-II : Animal Physiology</b>	40	15 (Attendance: 3 + Assignment: 6 + House Test 6)

#### PRACTICAL

Pertaining to Theory Paper-I and Theory Paper-II :

40

#### Total Marks (Semester-IV)

Theory	80 Marks
Practical	40 Marks
Internal Assessment pertaining to Theory Paper I & II	30 Marks
<b>Total</b>	<b>: 150 Marks</b>

**Note:**

- 1) The number of teaching hours per week will be three for each theory paper and three for each practical in every semester. In all, there will be 12 teaching hours per week covering both theory and practical requirements. (Six teaching hours for theory and Six teaching hours for practical per week)
- 2) There will be one Practical paper of 3 hours pertaining to the theory papers I & II in each semester. The timing of practical examination will be 9.00 am to 12.00 noon.

**SEMESTER - III**  
**PAPER I –CHORDATES-I**

**Max. Marks: 55**  
**Pass marks: 35%**  
**Theory-40**  
**Internal Assessment : 15**

**Time Allowed: 3 hours**  
**Lectures to be delivered: 45**  
**(Each of 45 minutes duration)**

**INSTRUCTIONS FOR PAPER SETTER**

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8 to 10 lines) which will cover the entire syllabus uniformly and will carry 16 marks in all.

**INSTRUCTIONS FOR CANDIDATES**

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

**SECTION-A**

1. Chordates : General Characters and Echinoderm Theory of Origin
2. Protochordates: a) Urochordata Type study-*Herdmania*.  
b) Cephalochordata—Type study-*Amphioxus*.  
c) Classification of following animals upto orders  
*Herdmania, Molgula, Pyrosoma, Dolilum, Salpa, Oikopleura*  
and *Amphioxus*.
3. Cyclostomata : a) External Characters of *Petromyzon*.  
b) Affinities of Cyclostomata.  
c) Classification of following animals upto orders  
*Myxine, Petromyzon* and *Ammocoetus* Larva.

**SECTION-B**

4. Pisces : a) Type study : *Labeo*.  
b) Types of Scales, Migration and Parental Care in fishes.  
c) Classification of following animals upto orders
  - i. Chondrichthyes: *Zygaena, Pristis, Narcine, Trygon, Rhinobatus* and *Chimaera*.
  - ii. Actinopterygii : *Polypterus, Acipenser, Lepidosteus, Muraena, Mystus, Catla, Hippocampus, Syngnathus, Exocoetus, Anabas, Diodon, Tetradon, Echeneis* and *Solea*.
  - iii. Dipnusti (Dipnoi) : *Protopterus* (lung-fish).
5. Amphibia : a) Type study –Frog.  
b) Parental Care.  
c) Classification of animals upto orders  
*Uraeotyphlus, Necturus, Amphiuma, Amblystoma, Triton, Salamandra, Hyla, Rhacophorus*.

## PAPAR-II : Chordates-II & EVOLUTION

**Max. Marks: 55**

**Pass marks: 35%**

**Theory-40**

**Internal Assessment : 15**

**Time Allowed: 3 hours**

**Lectures to be delivered: 45**

**(Each of 45 minutes duration)**

### INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8 to 10 lines) which will cover the entire syllabus uniformly and will carry 16 marks in all.

### INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

#### SECTION-A

1. Reptilia : a) Type study—*Uromastix*.  
b) Poison apparatus in snakes.  
c) Classification of following animals upto orders  
*Chelone, Testudo, Hemidactylus, Calotes, Draco, Varanus, Phrynosoma, Chamaeleon, Typhlops, Python, Eryx, Bungarus, Naja, Hydrus, Viper, Crocodilus, Gavialis* and *Alligator*.
2. Aves : a) Type study—Pigeon.  
b) Flight adaptation.  
c) Classification of following animals upto orders  
*Ardea, Milvus, Pavo, Tyto, Alcedo, Eudynamis* and *Casuaris*.

#### SECTION-B

3. Mammals : a) Type study—Rat.  
b) Dentition in Mammals.  
c) Classification of following animals up to orders  
*Ornithorhynchus, Echidna, Didelphys, Macropus, Loris, Macaca, Manis, Hystrix, Funambulus, Panthera, Canis, Herpestes, Capra, Pteropus*.
4. Organic Evolution:
  - i) Origin of life
  - ii) Evidences of organic evolution.
  - iii) Theories of organic evolution.
  - iv) Biological species concept.
  - v) Evolution of man.

**PRACTICAL SYLLABUS  
PAPER –SEMESTER III**

**I. Classification up to orders, excepting Pisces and Aves where classification up to subclasses only is required, habits, habitats, external characters and economic importance (if any) of the following animals:**

1. Urochordata : *Herdmania, Molgula, Pyrosoma, Dolilum, Salpa and Oikopleura.*
2. Cephalochordata: *Amphioxus.*
3. Chondrichthyes : *Zygaena* (Hammer headed shark), *Pristis* (saw fish), *Narcine* (Electric ray), *Trygon*, *Rhinobatus* and *Chimaera* (Rabbit fish).
4. Actinopterygii : *Polypterus, Acipenser, Lepidosteus, Muraena, Mystus, Catla, Hippocampus, Syngnathus, Exocoetus, Anabas, Diodon, Tetradon, Echineis and Solea.*
5. Dipnusti (Dipnoi) : *Protopterus* (African lung fish).
6. Amphibia : *Uraeotyphlus, Necturus, Amphiuma, Amblystoma* and its Axolotl Larva, *Triton, Salamandra, Hyla* and *Rhacophorus.*
7. Reptilia : *Hemidactylus, Calotes, Draco, Varanus, Phrynosoma, Chamaeleon, Typhlops, Python, Eryx, Ptyas, Bungarus, Naja, Hydrus, Viper, Crocodilus, Gavialis, Chelone* (Turtle) and *Testudo* (Tortoise).
8. Aves : *Ardea, Anas, Milvus, Pavo, Tyto, Alcedo, Eudynamis* and *Casuaris.*
9. Mammalia : *Ornithorhynchus, Echidna, Didelphys, Macropus, Loris, Macaca, Manis, Hystrix, Funambulus, Panthera, Canis, Herpestes* and *Pteropus.*

**2. Demonstration with the help of software:**

1. *Herdmania* : General anatomy.
2. *Labeo* : Digestive systems, reproductive systems and cranial nerves.
3. Chick : Digestive, arterial, venous and urinogential systems.
4. White Rat : Digestive, arterial, venous and urinogential systems.

**3. Make temporary preparation of following :**

1. Temporary preparation of spicules of *Herdmania.*
2. Permanent preparation of whole mount of pharynx of *Herdmania* and *Amphioxus*, Cycloid scales of *Labeo.*

**4. Study of following prepared slides :**

T.S. *Amphioxus* through various regions. Spicules, pharynx of *Herdmania* and pharynx of *Amphioxus*. Histology of rat/rabbit (Compound tissues).

## INSTRUCTIONS FOR PRACTICAL PAPER

1. Candidates will be required to submit their original note-books containing record of their laboratory work initiated with date by their teachers at the time of practical examination.
2. Students must be taken out for short excursion to the Zoological gardens, sea shores and hill stations to study habitat and ecology of the animals.
3. Practical examination shall be held in one session from 9.00 a.m. to 12.00 noon.
4. Practical examination is to be conducted by two external examiners.

*Max. Marks: 40*

*Time Allowed: 3 hours*

*Pass Marks: 35%*

1. Museum Specimens from Phylum Urochordata, Cephalochordata, Chondrichthyes, Actinopterygii, Dipnusti(Dipnoi), Amphibia, Reptilia, Aves, Mammalia. 3 specimens to be set for identification, classification and morphological note. 15
2. Demonstration regarding dissection 6
3. Identification of permanent slides. 4
4. Excursion note 5
5. Viva-voce 5
6. Practical note-book and charts 5

## SEMESTER - IV

### PAPER-I : BIOCHEMISTRY

*Max. Marks: 55*

*Pass marks: 35%*

*Theory-40*

*Internal Assessment : 15*

*Time Allowed: 3 hours*

*Lectures to be delivered: 45  
(Each of 45 minutes duration)*

#### INSTRUCTIONS FOR PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8 to 10 lines) which will cover the entire syllabus uniformly and will carry 16 marks in all.

#### INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

#### SECTION-A

##### BIOCHEMISTRY

1. Biochemistry and its scope; Carbohydrates, Proteins and Lipids.
2. Nucleic Acids : their classification and functions.
3. Enzymes : Nature, their classification and coenzymes.

#### SECTION-B

4. Carbohydrate Metabolism : The Embden Meyerhof, Parnas Pathway (Glycolysis), the tricarboxylic acid cycle, the hexose monophosphate shunt, glycogenesis and glycogenolysis.
5. Lipid Metabolism :  $\beta$ -oxidation of fatty acids, fate of glycerol and gluconeogenesis, interaction of carbohydrates and lipids, lipogenesis in tissues, ketosis.
6. Protein Metabolism : Metabolism of amino acids (Oxidative deamination, transamination and decarboxylation) hydrolysis of protein and ornithine cycle.

## **PAPER-II : ANIMAL PHYSIOLOGY**

**Max. Marks: 55**

**Pass marks: 35%**

**Theory-40**

**Internal Assessment : 15**

**Time Allowed: 3 hours**

**Lectures to be delivered: 45**

**(Each of 45 minutes duration)**

### **INSTRUCTIONS FOR PAPER SETTER**

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and will carry 6 marks each. Section C will consist of 8 short-answer type questions (8 to 10 lines) which will cover the entire syllabus uniformly and will carry 16 marks in all.

### **INSTRUCTIONS FOR CANDIDATES**

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

#### **SECTION-A**

1. Digestion : Digestion of dietary constituents, regulation of digestive processes and absorption, types of nutrition, feeding mechanism, extra and intra cellular digestion, enzymatic digestion and symbiotic digestion.
2. Blood : Composition and functions of blood and lymph, molecular structure and function of haemoglobin, blood clotting, blood groups including Rh-factor, haemostasis and haemopoiesis.
3. Heart : Origin and regulation of heart beat, cardiac cycle, electrocardiogram, cardiac output, blood flow and its regulation, blood pressure and micro-circulation.
4. Respiration : Transport of O<sub>2</sub> and CO<sub>2</sub>, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride shift, Haldane effect and control of breathing.

#### **SECTION-B**

5. Excretion : Urine formation and osmoregulation.
6. Muscles : Ultrastructure, chemical and physiological basis of skeletal muscle contraction.
7. Neural Integration: Structure of Neuron, resting membrane potential, origin and propagation of impulse along the axon, synapse and myoneural junction.
8. Endocrine : Structure and physiology of thyroid; Parathyroid, adrenal, hypothalamus, pituitary, pancreas and gonads.

**PRACTICAL SYLLABUS  
PAPER – SEMESTER - IV**

1. Identification of food stuffs : starch, glucose, proteins and fats in a given solution.
2. Demonstration of osmosis and diffusion.
3. Demonstration of presence of amylase in saliva, denaturation with change of pH and temperature.
4. Analysis of urine for urea and glucose.
5. Determination of coagulation and bleeding time of blood in man/rat/rabbit.
6. Determination of blood groups of human blood sample.
7. Recording of blood pressure of man.
8. Estimation of haemoglobin content.
9. Study of TLC and DLC.
10. Preparation and study of human blood smear.
11. Preparation of permanent mount of striated muscles.
12. Preparation of permanent mount of myelinated nerve fibre.
13. Field study : Visit to a clinical lab.
14. Study of skeleton of *Labeo Rana Varanus Gallus* and *Oryctolagus* (Rabbit)

**INSTRUCTIONS FOR PRACTICAL PAPER**

1. Candidates will be required to submit their original note-books containing record of their laboratory work initiated with date by their teachers at the time of practical examination.
2. Students must be taken out for short excursion to the Zoological gardens, sea shores and hill stations to study habitat and ecology of the animals.
3. Practical examination shall be held in one session from 9.00 a.m. to 12.00 noon.
4. Practical examination is to be conducted by two external examiners.

*Max. Marks: 40*

*Time Allowed: 3 hours*

*Pass Marks: 35%*

1. Physiology Experiment out of Experiment No. 1-4	8
2. Physiology Experiment out of Exp. No. 5-8	8
3. Preparation & Study & Sketch of slide out 9-12	8
4. Identification of bones A & B with Labelled sketch 3+3	6
5. Viva-voce	5
6. Note Book	5