

## **B.Sc. Part II (THEORY) Zoology**

There will be three written papers and one practical examination. The following courses are prescribed.

### **Paper I: Chordata**

#### **Unit- I**

**Hemichordata**: Classification and detailed study (habit, morphology, anatomy, physiology and development) of *Balanoglossus*

**Cephalochordata**: Classification and detailed study (habit, morphology, anatomy and physiology) of *Branchiostoma (Amphioxus)*.

#### **Unit -II**

**Urochordata**: Classification and detailed study (habit, morphology, anatomy, physiology and post embryonic development) of *Herdmania*

#### **Unit-III**

Classification of different classes of vertebrates (**Pisces, Amphibia, Reptilia,**) up to order with characters and examples. Poisonous and non poisonous snakes and biting mechanism. Neoteny

#### **Unit-IV**

Classification of different classes of vertebrates (**Aves and Mammalian**) up to order with characters and examples. Dentition in mammals.

### **Paper II: Animal distribution, Evolution and Developmental Biology**

#### **Unit-I**

**Animal distribution**: Geological and geographical distribution with their characteristic fauna; fossils.

#### **Unit-II**

**Origin of Life**, concept of species (classical & modern concept)

**Evolution**: Evidences (including physiological and serological); Theories of evolution (including Neo-Lamarckism, Darwin-Wallace theory of natural selection, Neo-Darwinism, Modern synthetic theory). Evolution of Man. Mutation

#### **Unit-III**

**Developmental Biology I**: Aims and scope of Developmental Biology. Gametogenesis, Fertilization, Egg: structure and types. Types & patterns of cleavage

#### **Unit-IV**

**Developmental Biology II:** Process of Blastulation & Gastrulation. Fate Map.  
Development of Chick up to formation of Primitive streak and mammal (*in out line*)  
Extra embryonic membranes of chick.  
Placentation and types of Placenta.

### **Paper III: Physiology and Biochemistry**

General physiology (in outline) with special reference to mammals

#### **Unit-I**

Physiology of digestion, respiration, and blood and circulation

#### **Unit-II**

Physiology of excretion and osmoregulation, neural transmission, muscles

#### **Unit-III**

Physiology of endocrine system, thermoregulation

#### **Unit-IV**

General chemistry and classification of carbohydrates, lipids and proteins; Enzymes

## B.Sc. Part II

### ZOOLOGY PRACTICAL SYLLABUS

#### **Urochordata**

##### **(a) Herdmania**

- (i) External characters
- (ii) Dissection
- (iii) (a) Permanent preparation of branchial wall  
(b) Section of test and glycerine preparation of spicules.  
Glycerine and permanent preparation on neural gland complex (neural gland, nerve ganglion and dorsal tubercle).
- (iv) Larva and metamorphosis- prepared slides.

- (b) (i) Thaliacea : *Pyrosoma*, *Doliolum*  
(ii) Larvacea : *Oikopleura*.

#### **Cephalochordata**

##### **Branchistoma (*Amphioxus*)**

- (i) General features
- (ii) (a) Permanent preparation of the pharyngeal wall  
(b) Oral hood and velum- prepared slides  
(c) Transverse section through the body – prepared slides.  
(d) Models illustrating development

#### **Cyclostomata**

***Petromyzon* (Lamprey) - External characters**

##### **Chondrichthyes**

##### **(a) Fish**

- (i) External characters
- (ii) Exo-skeleton Glycerine and permanent preparation of placoid scales
- (iii) Myotomes
- (iv) Endoskeleton
- (1) Axial skeleton
  - (a) skull
  - (b) Visceral Skeleton
  - (c) Vertebral column
- (2) Appendicular skeleton
  - (a) Pectoral girdle and fins
  - (b) Pelvic girdle, fins and claspers
  - (c) Median fins
- (v) Dissection
  - (a) Digestive system  
Examination of the folds of stomach and “scroll valve”
  - (b) Vascular system

Heart, ventral aorta, dorsal aorta, arterial arches ( afferent and efferent )

- ( c ) Gills
- ( d ) Urinogenital system
- ( e ) Nervous system : Cranial nerves
- ( f ) Internal ear
- ( g ) Eye muscles
- ( h ) Permanent preparation of ampullae of Lorenzini
- ( i ) Section through various regions of the body of adult and embryo
- ( j ) Embryo with yolk-sac placenta

( b ) *Pristis* ( Saw fish ), *Astrape* ( Indian electric ray ) *Chimaera* ( rabbit fish ) Slide showing development of placoid scales.

### **Osteichthyes**

- ( a ) *Labeo rohita* ( rohu )- General morphology and dissected specimen.
- ( b ) *Acipenser* ( sturgeon ), *Lepidosteus* ( gar-pike ), *Hippocampus* ( sea horse ) *Antennarius* ( Indian angler ), *Anguilla* ( eel ), *Pleuronectes* ( sole ), *Exocoetus* ( flying fish ), *Clarius* ( cat fish ), *Anabas* ( climbing perch ) and *Neoceratodus* ( lungfish ).
- ( c ) Different kinds of scales- prepared slides

### **Amphibia**

- ( a ) *Rana tigrina* ( The Indian bull-frog )  
Development of frog from modles
- ( b ) Urodela :  
*Necturus*, *Ambystoma* and Axolotal larva
- ( c ) Anura :  
*Bufo*, *Rhacophorus* ( tree frog ), *Alytes* ( midwife toad ).
- ( d ) Gymnophiona : *Ichthyopnis*

### **Reptillia**

- ( a ) *Varanus*
  - ( i ) External characters
  - ( ii ) Skeleton
- ( 1 ) **Axial Skeleton**
  - ( a ) Skull
  - ( b ) Vertebral column
  - ( c ) Ribs and sternum
- ( 2 ) **Appendicular Skeleton**
  - ( a ) Pectoral girdle and fore-limb.
  - ( b ) Pelvic girdle and hind-limb.
- ( b ) *Lacertilla*  
*Varanus* ( Indian monitor ), *Holoderma* ( poisonous lizard )  
*Hemidactylus* ( wall lizard ), *Chamaeleon* ( garden lizard ) *Draco* ( flying lizard ).
- ( c ) *Ophidia*  
Difference between poisonous and non-poisonous snakes, *Naja* ( cobra ),  
*Vipera* ( viper ), *Typhlops* ( burrowing snake ) and *Python*. Biting mechanism of a poisonous snake ( model ).
- ( d ) *Chelonia* : Derman armature
- ( e ) *Crocodylia* : Difference between Alligator, Crocodile and Gavialis.
- ( f ) Extinct reptiles, Models ( five )

*Dimetrodon*, *Diplodocus*, *Pteranodon*, *Tyrannosaurus* and *Ichthyosaurus*

## Aves

### (A) *Columba livia intennedia* (pigeon)

- (i) External Characters. Structure of Feather. Varieties of feathers. Developments of feather-prepared slide.
  - (ii) Skeleton of fowl Axial skeleton:
    - (a) Skull
    - (b) Vertebral column
    - (c) Ribs and sternum
- (2) Appendicular skeleton.
- (a) Pectoral girdle and fore-limb
  - (b) Pelvic girdle and hind-limb.

### (B) (i) Archaeornithes-Archaeopteryx (cast)

#### (ii) Neornithes:

- (a) Palaeognathae: *Struthio* (ostrich);
- (b) Neognathae: *Gallus* (fowl), *Anser* duck, *Corvus* (crow), *Psittacuca* (parrot) and *Pavo* (peacock).

Perching mechanism: Model

Skulls and Beaks of Birds.

Feet of birds: Models

### (C) Embryonic membranes-whole mount of 72 hour's chick embryo

## Mammalia

### (A) (i) Prototheria: *Ornithorhynchus* (Platypus)

#### (ii) Metatheria : *Macropus* (Kangaroo).

#### (iii) Eutheria :

- (a) Edentata: *Dasypus* (Armadillo)
- (b) Pholidota: *Manis* (Scaly ant-eater).
- (c) Cetacea: *Platanista* (Ganges dolphin).
- (d) Perissodactyla: *Equus caballus* (horse), *Equus vulgaris* (ass), *Equus zebra* (zebra), *Rhinoceros unicornis* (rhinoceros).
- (e) Artictyla: *Camelus dromedaries* (A rabian camel), *Giraffa camelopardalis* (giraffe) Box (ox), *Ovis* (sheep), *Capra* (goat), *Cervus* (deer), *Sus* (dog).
- (f) Proboscidea: *Elephas indicus* (elephant).
- (g) Carnivora: *Felis domesticus* (Cat), *Panthera leo* (lion), *Acinonyx tigris* (Cheetah), *Canis familiari* (dog), *Ursus* (bear) *Hyaena* (hyanea), *Phoca* (seal)
- (h) Rodentia: *Mus* (domestic rat), *Hystrix* (Porcupine)
- (i) Lagomorpha: *Lepus* and *Oryctolagus* (hare and rabbit)
- (j) Insectivora: *Erinaceus* (hedge-hog), *Crocidura* (chhachhundar)
- (k) Chiroptera: *Pteropus* (Flying-fox).
- (l) Primates: *Macaca* (rhesus monkey), *Hylobates* (gibbon), *Simia* (Orangutan), *Anthropo pithecus* (chimpanzee), *Gorilla*, *Homo sapiens* (man).

## Histology

- (i) Tissues: Preparation of the following
- (a) Epithelia:
  - (i) Squamous (ii) Ciliated and (iii) Stratified
- (b) Muscular:
  - (i) Striped muscles (ii) Unstriped muscles.
- (c) Connective
  - (i) Areolar tissue (ii) Tendon the leg muscles of frog (tease and examine in glycerine)
  - (ii) Adipose tissue from insect and frog (iv) cartilage (free hand sections of frogs hyoid and suprascapula, stain with haematoxyline and (v) Bone (Decalcified).
- (d) Blood; Preparation of Vertebrate blood film, stain with Leishmann's stain.
- (e) Nervous: Neurons
- (f) Histology of various organs-prepared slides.

## Physiology

- (i) Experiments to be performed by candidates: Test for amylase. Osmolarity of blood, Hemin crystals and test for sugar and acetone in urine Determination of haemoglobin % in blood sample (s).
- (ii) Detection of amino acids in blood of an animal by paper chromatography.

### General :

Candidates will be required, to show knowledge of the method of microscopic techniques and to examine, describe or dissect the types prescribed. Candidates will also be required to submit their notebooks containing a complete record of laboratory work initiated and dated by the teacher for the determination of result of examination.