West Bengal State University

(Barasat, North 24 Parganas)

Syllabus (2009-2010)
Zoology (General)

Full Marks for Three Years Degree Course – 400

Part – I (1st Year), 100 Marks

Paper – I (Theoretical, 100 marks)

Part – II (2nd Year), 200 Marks

Paper – II (Theoretical, 100 marks)
Paper – III (Practical, 100 marks)

Part – III (3rd Year / Final Year), 100 marks

Paper – IV A (Theoretical – 60 marks)
Paper – IV B (Practical – 40 marks)

Part – I

Paper – I (Theory, 100 marks)

Group A – Nonchordates (30 marks) 30 classes

1. Classification with distinctive features and suitable examples of sub kingdom Protozoa (upto Phyla) and Phylum Porifera, Cnideria, Platyhelminthes, Nemathelminthes, Annelida, Arthropoda, Mollusca and Echinodermata (upto Sub class).

2. General structure and function of the following with reference to the specimens mentioned:

i) Locomotion: a) Microfibrils (*Amoeba*), b) Cilia (*Paramoecium*), c) Parapodia (*Neanthes*).

ii) Feeding and digestion: a) Microphagy (*Amoeba),* b) Macrophagy (Hydra),
c) Filter feeding (*Balanoglossus*)

iii) Respiration: a) Ctenidium and Pulmonary sac (*Pila*), b) Trachea and Booklung (cockroach, scorpion).

iv) Excretion: a) Flame cell (*Taenia*), b) Nephridia (Earthworm), Malpighian tubules (Cockroach)

v) Circulation: a) Open circulation (Cockroach), b) Closed circulation (Earthworm), Haemal circulation (Starfish)

vi) Neural integration: a) Integration - simple and complex nerve nets b) Nervous system (Earthworm, Cockroach, Apple snail)

vii) Reproduction and Life cycle: a) Fission (*Amoeba*), b) Conjugation (*Paramoecium*),
c) Sexual (Earthworm), d) Metagenesis (*Obelia*), e) Metamorphosis in insects.

Group B – Chordates (30 marks) 30 classes

1. Classification of Phylum Chordata with distinctive features and suitable examples

- Fishes and Aves (upto Sub class); Amphibia, Reptilia and Mammalia (upto living orders).

2. a) Functional anatomy in relation to filter feeding (*Branchiostoma*); circulation with special reference to portal system.
b) Structure and function of the following:
i) Integument - general structure and function; glands in general and integumentary derivatives (scales in fishes; horny scales and plates in reptiles; feathers of birds; hair of mammals).
ii) Digestive system - pharynx (*Ascidia*); stomach (*Columba* and *Bos*).
iii) Respiratory system - gills (fish); accessory respiratory organs (fish); lungs (birds and mammals).
iv) Excretory system – pro-, meso- and meta-nephric kidneys in vertebrates.
v) Circulatory system - single circuit heart (fish); double circuit heart (amphibia and mammals); modification of aortic arches in vertebrates.
vi) Nervous system - Brain of *Bufo*; origin and distribution of cranial nerves in vertebrates.

Group C – Parasitology and Endocrinology (20 marks) 15 classes

1. a) Parasitism (definition and different types) b) an outline idea of other interspecific interactions (symbiosis, commensalism and mutualism).
2. Life history, pathogenecity and clinical features of i) *Entamoeba histolytica*, ii) *Plasmodium vivax*, iii) *Ascaris*.
3. General characters of hormones.
4. Mammalian endocrine glands (pituitary, thyroid and pancreas with their hormonal functions).

Group D – Ecology, Ecosystem and Environment (20 marks) 15 classes

1. Definition, components, energy flow, food chain, food web, ecological pyramids.
2. Population – definition and growth.
3. Community – definition and types.
4. Pollution – air, water and noise.
5. Global warming and its impact on environment.
6. Concept of EIA.

Part – II

Paper – II (Theory, 100 marks)

Group A – Evolutionary Biology (30 marks) **30 classes**

1. Definition of Systematics and Taxonomy.
2. Species as unit of evolution (definition and types: biological, monotypic and polytypic).
3. Chemical basis of origin of life.
4. Darwinism and synthetic theory of evolution.
5. Hardy-Weinberg equilibrium in relation to natural selection - a brief idea.
6. Anatomical and physiological adaptation: aquatic, desert and volant animals.
7. Zoogeographical realms and their subdivisions with characteristic fauna.

Group B – Cell and Molecular Biology (30 marks) **30 classes**

1. Ultrastucture and function of plasmamembrane, GERL system and ribosome.
2. Chromosome structure-nucleosome model.
3. Cell cycle (basic idea).
4. Physico-chemical structure and properties of DNA and RNA.
5. Nucleic acids as genetic material.
6. Mechanism of replication, transcription and translation in *E. coli*
7. Modes of inheritance of autosomal and sex-linked genes in man; Thalassemia and Haemophilia.
8. Linkage and recombination.
9. Point mutation and changes in chromosome number with reference to chromosomal aberrations. Down syndrome and Klienfelter syndrome.
10. Sex determination in *Drosophila* and man.

Group C – Developmental Biology (20 marks) **20 classes**

1. Spermatogenesis and oogenesis.
2. Fertilization in sea-urchin.
3. Types of eggs and cleavage; process of cleavage in frog and chick
4. Gastrulation in frog and chick
5. Placentation in mammals.

Group D – Physiology and Biochemistry (20 marks) **20 classes**

1. Formed elements in vertebrate blood; clotting and coagulation; ABO blood

group and Rh factor.
2. Enzyme - classification and characteristics; mechanism of enzyme action; effects on enzymes action (substrate concentration, pH and temperature).
3. Classification of carbohydrate, protein and lipid; Concept of glycolysis and Kreb's cycle.
4. Neoglucogenesis.
5. A brief idea on muscle contraction.
6. Physiology of nerve impulse and synaptic transmission and neuromuscular junction.

Paper - III (Practical, 100 marks)

1. Dissection

Cockroach- Digestive, nervous and female reproductive system
Tilapia (*Oreochromis* sp) – urinogenital system and brain,

2. Mounting and preparation:

a) Mouth parts of cockroach.
b) Setae of earthworm.
c) Cycloid, ctenoid and placoid scales.
d) Blood film of rat and haemolymph of cockroach (Leishman/Giemsa stain).
e) Gut content of cockroach for parasites.
f) Whole mount of aquatic micro-arthropods.
g) Epithelial cells from buccal smears.

3. Identification with reasons:

a) Bones: Skull, vertebrae, limb and girdle bones of *Columba* and *Cavia*.

b) Histological slides: T.S. of mammalian ileum, lung, liver, pancreas, testis, ovary, kidney and thyroid.

c) Non-chordate specimens: *Amoeba, Plasmodium, Paramoecium, Scypha, Obelia,* Sea-anemone, *Ascaris,* Leech, Centiped, Miliped, *Scorpion, Lamellidens, Achatina, Loligo, Starfish, Balanoglossus.*

d) Chordate specimens: *Ascidia, Branchiostoma, Petromyzon, Scoliodon, Anabas,* tree frog, Axototl larva, *Tylototriton, Gecko, Hemidactylus, Mabuia, Turtle, Naja, Chiroptera.*

4. Report on field study tour:

Any **one (1)** site of Zoological importance: (Zoogarden, Museum, Sericulture centre, Apiculture centre, Fisheries, Agricultural firm or such places).

5. Viva-voce

6. Laboratory Note book

Part – III

Paper - IV A (Theory – 60 marks)
60 classes

Aquaculture - Principles, definition and scope. Fisheries resources of India (inland and off-shore). Exotic fishes - their merits and demerits. Induced breeding and its importance. Basic principles of different aquaculture system (Polyculture and Integrated farming). Marine pearl culture, culture of prawn and shrimps.

Sericulture – Characteristics of sericulture industry and its scope; kinds of silk worm, host plants. Life history and rearing of *Bombyx mori*, harvesting and processing of cocoon, reeling and extraction of silk, pest on mulberry plants and diseases of *Bombyx mori* and control measures.

Apiculture - Types of honey bees, modern methods of apiary management, products and its uses. Problems and prospects.

Pest and Pest Management – Pest - definition, types, life history and control i) *Scirpophaga*, ii) *Sitophilus* and iii) *Bandicoota*, Concept on IPM.

Poultry and Poultry Management - Duck and fowl - Types of breeds, rearing and disease management.

Wild life and Biodiversity –

1. Conservation of Wild life – Importance and strategies, Concept of Biosphere Reserve, National Park and Wild life Sanctuary.
2. Basic concept of Biodiversity, Biodiversity hotspot.
3. Endangered Indian mammals, Animal Cruelty Prevention Act**.**

Biotechnology and Immunology –

1. Basic concept of genetic engineering and cloning;
2. Concept of immunity;
3. Outline structure and classification of immunoglobulin; antigen-antibody reaction;
4. Basic principle of vaccination.

Paper – IV B (Practical 40 marks)

1. Experimental works:

i) Estimation of dissolved O_2 content of water.

ii) Estimation of dissolved free CO_2 content of water.

iii) Pedigree analysis: sex-linked recessive, autosomal recessive and dominant.

iv) Determination of ABO blood group and Rh factor.

vii) Measurement of pH of water.

viii) Sampling of zooplankton and extraction of soil micro-arthropods.

ix) Tests for food colors/ adulteration: mustard oil, red chili powder, turmeric powder, toxic colors in vegetables/ sweets.

2. Field excursion: (submit report of field excursion at **any one** place from below) i) Estuarine/ freshwater fish farm.

ii) Poultry centre.

iii) Apiary.

iv) Sericulture centre.

v) Places of wildlife interest (sanctuary, national park, biosphere reserve etc)

vi) Agricultural farms for pest study and idea of IPM practices.

vi) Species diversity studies in forest ecosystem/coastal regions.

3. Identification: (write specimen characters, scientific name and applied importance)

Plasmodium, microfilaria of *Wuchereria bancrofti, Taenia solium, Scirpophaga insertulas, Sitophilus oryzae, Leucinodes orbonalis, Anomis sabulifera, Bombyx mori, Lepisma,* Termite*, Bandicoota bengalensis, Labeo rohita, L. bata, Catla catla, Cirrhinus mrigala, Hypopthalmichthyes molitrix, Cyprinus carpio, Ctenopharyngodon idella, Lates calcarifer, Temialosa ilisha, Penaeus monodon, Macrobrachium rosenbergi.*

4. Viva-voce

5. Laboratory Note book