



# West Bengal State University

(Barasat, N-24 Parganas, India, Pin Code 700126)

## PART-III-300 Marks

### Paper-VII: Theory (100)

#### Module 701: Animal Physiology (40)

1. Transport across cell surface membrane, Donnan membrane equilibrium
2. Functions of mammalian blood: Oxygen transport and CO<sub>2</sub> transport
3. Neurophysiology: Generation of action potential and propagation of nerve impulse in myelinated and non-myelinated nerve fibers. Synaptic and neuro-muscular junctions : structure and functions
4. Respiration: gill respirations in fishes, respiration in air-breathing fishes, respiration in avian lungs
5. General architecture of skeletal (striated) muscle and smooth muscle; Ultrastructure of skeletal muscle sarcomere, molecular structure of actin and myosin, Muscle contraction: sliding filament theory
6. Swim bladder and its functions in teleost fishes
7. Water and osmotic regulations : problems in marine cyclostomes, elasmobranchs and teleosts, freshwater teleosts, in hot desert environments (camel) and examples of significant adaptations solving it by different animal groups
8. Urine formation in human kidney
9. Bioluminescence: occurrence, mechanism of light production

#### Text Book:

[Animal Physiology by Kurt Neilsen-Schmidt, Cambridge Univ. Press, New Delhi, 2002 Indian Ed.](#)

#### References:

[Textbook of Medical Physiology by A.C. Guyton & J.E. Hall](#)

#### Module 702: Endocrinology and Reproductive biology (40)

1. Classification of vertebrate hormones based on chemical nature and mechanism of action (names and examples only).
2. Hormone delivery systems: Endocrine, neuroendocrine, paracrine, neurocrine, autocrine (Definitions and examples only)
3. Feed back control of hormone secretion: negative and positive.
4. Hormone biosynthesis (including sites of synthesis, outlines only): Thyroid hormones (T<sub>3</sub>, T<sub>4</sub>), testosterone, estrogen, progesterone, adreno-cortical hormones, Insulin, Adrenal catecholamines.

5. Physiologic functions of hormones: Insulin, glucagon, T3 and T4.
6. Hormonal control of spermatogenesis
7. Hormonal control of mammalian ovarian cycle, differences between estrous and menstrual cycle.
8. Mechanism of hormone actions (outlines only): cytoplasmic receptor, nuclear receptor, membrane receptor, HRE, HSP, cAMP, cGMP, IP3—DAG, tyrosine kinase, calcium-calmodulin
9. Endocrine disorders (*symptoms and causes only*): Diabetes insipidus; IDDM & NIDDM, Hypothyroidism and hyperthyroidism, Conn's and Cushing's syndrome.

Text Book :

Endocrinology by Turner and Baxter

References:

Textbook of Medical Physiology by A.C. Guyton & J.E. Hall

Module 703: **Histology (20)**

1. Basic tissue types: epithelial, connective, cardiac and nervous tissue (typical structure of neuron and types of neuron, glial cells etc)
2. Membrane specializations of epithelia. (Intercellular surface [cell junctions], luminal surfaces and basal surfaces.).
3. Exocrine glands: Types and discharge of secretory products (merocrine, apocrine, holocrine).
4. Principles of tissue fixation, staining,
5. Histology of: stomach, pancreas, testis, ovary, thyroid, lymph node. (Outline of structures).
6. Histological structure of mammalian nephron and functions of each region.

Text Books :

Basic Histology: Text & Atlas by Luiz Carlos Junqueira et al. McGraw-Hill (also visit- <http://www.freebook4u.net/2011/03/basic-histology-text-atlas-11th-edition.html>)

References:

1. Histology: A Text and Atlas by Ross & Reith. Lippincott Williams
2. Histology & Cell Biology by Kurt E. Johnson; Harwal Publishing Company
3. A Text book of Histology: practical guide by J.P. Gunashekharan, 2<sup>nd</sup> Ed. Elsevier India

## Paper VIII: Theory (100)

Module 801: **Developmental Biology (30)**

1. Outlines of historical concepts and experiments in the emergence of developmental biology- Induction, Fate map, Spemann and Mangold's organizer transplant experiments, von Baer's laws.
2. Germ layers and its contributions to the development of different tissues in vertebrates.

3. Origin of germ cells, Structural features of sperms and eggs in sea urchins and in mammals, Gametogenesis in mammals,
4. Fertilization: external fertilization in sea urchins, internal fertilization in mammals (in depth molecular details not required)
5. Cleavage : Types of cleavage found in animals and animal groups that exhibit a type, outlines of cleavage process in *C. elegans*, Zebra fish and *Xenopus* and chick
6. Gastrulation: generalized patterns, brief outlines of the process in *C. elegans*, Zebra fish, *Xenopus* and chick
7. Organogenesis : development of brain in chicken
8. Conceptual outlines (very brief) of – Cell potency and Stem Cells, Sex determination in *Drosophila* and Man, Environmental sex determination in reptiles. HOX genes in development

**Text Books :**

Principles of Development : by Lewis Wolpert, Jim Smith, Tom Jessell, Peter Lawrence (3<sup>rd</sup> Ed. OUP, India)

**References :**

Developmental Biology by Scott Gilbert

**Module 802: Environmental Pollutions and Toxicology (20)**

1. Environmental pollutions (nature and sources of pollutants, impacts on ecosystems and humans, remedies): water, soil, air and sound pollutions
2. Environmental laws: major ones applicable in West Bengal
3. Toxicology: including its significance as a branch of Science
4. Dose-response relationships
5. In vivo and In vitro toxicity tests
6. Introduction to the concepts of detoxification mechanisms

**Text Books:**

1. Rana, S. V.: Environmental Pollution - Health and Toxicology
2. Curtis D Klaassen: Casarett and Doull's Toxicology

**Module 803: Medical Zoology (15)**

1. Mosquito-borne diseases: Malaria and Filariasis- causative agents, their life cycle, modes of infections in man, major modes of treatments, major vector species in India, their ecology and life cycles, control measures
2. Mosquito-borne diseases: Dengue and DHF, Chikungunya- causative virus, symptoms and treatments
3. Visceral Leishmaniasis (Kala-azar)- causative species and vectors in West Bengal
4. Common ticks and mites in human surroundings and diseases caused by them

Text Book:

Hati, A. K., Medical Entomology, Allied Publishers

Module 804: **Economic Zoology (35)**

1. Fishes and fishery: diversity of indigenous freshwater, estuarine, marine fishes and shell fishes in West Bengal. Invasive and exotic species of fishes in West Bengal. Techniques of modern pisciculture and prawn culture. Problems related to wild prawn seed collections in Sunderbans, fish productivities in India and West Bengal, ecology and degradation of freshwater fish habitats and decrease in wild fish stocks (very brief idea)
2. Sericulture: silks and silk worms, sericulture practices- methods, scopes and problems
3. Apiculture: Honey bees and their behaviours in relation to bee-keeping, popular methods of bee keeping, scopes and problems
4. Lac culture: Lac and lac insects, host plants and lac cultivation, scopes and problems
5. Poultry birds: different breeds, their advantages and disadvantages, importance of indigenous breeds
6. Cattle, goats and lambs: different breeds, their advantages and disadvantages, importance of indigenous breeds

Text Books:

Economic Zoology- Shukla and Upadhyaya. Rastogi Pub., 2<sup>nd</sup> Ed, 2005

References :

- Fish and Fisheries of India by Jhingran. Hindustan Publishing
- Encyclopedia of Economic Zoology. 2 vols. By Khan, A. A. (Editor), 2007. Anmol Publications. 2007
- Freshwater Aquaculture by Santhanam *et al.*
- Aquaculture by T. V. R. Pillay
- Animal Husbandry by G. C. Banerjee
- Sericulture & Silk Industry by D. C. Sarkar
- Lac Culture by N. Ghorai
- Bee keeping in India by ICAR
- Livestock & Poultry Production by Singh and Moore

## **Paper IX: Practical (100)**

### **GROUP A : Full Marks 50**

1. Physiology: Blood slide preparations (from goat/rat) to identify and study the characteristic features of different types of WBC, total count of WBC. Determination of haemoglobin content of goat/rat blood by Sahli's haemoglobinometer. Human B.P. and pulse measurements etc. (15)
2. Microtomy: Paraffin section cutting and mounting, H&E staining of histological tissues and identifying the stained slide (name, identifying characters only). [fixation and paraffin embedding procedure should be demonstrated in the class] (15)
3. Determination of soil and water pH (With pH meter); Quantification of free CO<sub>2</sub> and dissolved O<sub>2</sub> (Winkler's Method) in water sample (10)
4. Viva voce (5)
5. Lab Note Book (must include actual lab notes and sketches) (5)

### **Group B : Full Marks 50**

1. Developmental Biology: Identification of chick's embryonic stages (at 24, 48 & 96 hrs. of incubation. Identification of fry stages of a carp fish (any cultivated carp species) (10)
2. Morpho-metric studies: mouth parts and fins of fishes (any major Carp, *Mystus*, Tilapia), different aspects of shells of *Acatina*, *Pila*, *Bellamya*, Ants (Total length, Head length, Trunk and Petiole length, Gaster length of any big sized easily available ant like *Camponotus*, *Oecophila*, *Tetraoponera*) (15)
3. Medical entomology: Identifications of *Culex*, *Aedes* and *Anopheles* mosquitoes from whole mount dry specimens. Identification of *Plasmodium*, *Entamoeba*, *Giardia*, *Fasciola*, *Ascaris*, *Wuchereria* (15)
4. Viva voce (5)
5. Lab Note Book (must include actual lab notes and sketches) (5)