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**THIRD SEMESTER**  
**COURSE: MINOR**  
**PHYSIOLOGY AND BIOCHEMISTRY**  
**PAPER: MIN-ZOO – 3.2**  
**CREDIT POINT: 04(3 Theory + 1 Practical)**

### **Course Objectives**

- To impart an understanding of the fundamental physiological and biochemical processes in animals.
- To provide insights into organ systems, their regulation, and their biochemical underpinnings.
- To prepare students for advanced studies in animal physiology, biochemistry, and related fields.

### **Learning Outcomes:**

Upon successful completion of this course, students will be able to:

- Explain the physiological basis of digestion, respiration, excretion, circulation, nerve conduction, muscle contraction, reproduction, and endocrinology.
- Describe major biochemical pathways and enzyme functions.
- Apply core concepts of physiology and biochemistry in zoological research and real-world contexts

Theory( 3 credits)

### **Unit 1: Digestion and Respiration**

1. Physiology of digestion in the alimentary canal
2. Absorption of carbohydrates, proteins, and lipids
3. Pulmonary ventilation; respiratory volumes and capacities
4. Transport of oxygen and carbon dioxide in blood

### **Unit 2: Excretion and Cardiovascular System**

1. Structure of nephron; mechanism of urine formation
2. Counter-current mechanism
3. Composition of blood; haemostasis
4. Structure of heart; origin and conduction of cardiac impulse
5. Cardiac cycle

## Unit 3: Reproduction and Endocrine Glands

1. Physiology of male reproduction: spermatogenesis
2. Physiology of female reproduction: oogenesis, menstrual cycle, hormonal control
3. Structure and function of pituitary, thyroid, parathyroid, pancreas, and adrenal glands

## Unit 4: Nerve and Muscle

1. Resting membrane potential; graded potential; action potential: properties, origin, and conduction (myelinated and non-myelinated fibers)
2. Mechanism of synaptic transmission
3. Mechanism of skeletal muscle contraction

## Unit 5: Enzymes and Metabolism

1. Enzyme classification and nomenclature; mechanism of action; enzyme kinetics
2. Glycolysis; Krebs cycle; pentose phosphate pathway; electron transport chain
3.  $\beta$ -oxidation of fatty acids; transamination; deamination; urea cycle

### Practicals (1 Credit)

- Demonstration of enzyme activity (e.g., salivary amylase).
- Determination of haemoglobin content.
- Measurement of blood pressure and pulse rate.
- Study of permanent slides/models of various physiological systems.
- Experiments on muscle and nerve physiology (demonstration based).
- Urine analysis for urea, sugar, and chloride.

### Suggested Readings

- **Ganong's Review of Medical Physiology**, Kim E. Barrett et al. (26th Ed., McGraw-Hill Education, 2019)
- **Textbook of Medical Physiology**, Guyton & Hall (12th Ed., Harcourt Asia/W.B. Saunders)
- **Biochemistry**, J.M. Berg, J.L. Tymoczko & L. Stryer (6th Ed., W.H. Freeman)
- **Lehninger Principles of Biochemistry**, Nelson & Cox (4th Ed., W.H. Freeman)
- **Harper's Illustrated Biochemistry**, R.K. Murray et al. (28th Ed., McGraw-Hill)