

Dept. of Zoology, Bankura Sammilani College

MODULE BREAKUP OF THE SYLLABUS

SESSION 2022-23

CLASS : Sem-II ( Zoology Honours)

(Theory Paper : Core T3 and Core T4)

| Month                         | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| January – February -<br>March | <p><b>Non-chordates II</b></p> <p><b><u>Unit 3: Arthropoda</u></b></p> <ol style="list-style-type: none"><li>1. General characteristics and Classification up to classes</li><li>2. Respiration in Arthropoda (Gills in prawn and trachea in cockroach)</li><li>3. Metamorphosis in Lepidopteran Insects.</li><li>4. Social life in termite</li><li>5. Compound eye in insects</li></ol> <p><b><u>Unit 2: Annelida</u></b></p> <ol style="list-style-type: none"><li>1. General characteristics and Classification up to classes</li></ol> <p><b><u>Unit 2: Annelida</u></b></p> <ol style="list-style-type: none"><li>2. Excretion in Annelida through nephridia.</li><li>3. Metamerism in Annelida</li></ol> <p><b>Cell Biology</b></p> <p><b><u>Unit 1: Overview of Cells</u></b></p> <ol style="list-style-type: none"><li>1. Basic structure of Prokaryotic and Eukaryotic cell</li></ol> <p><b>Unit 3: Cytoplasmic organelles I</b></p> <ol style="list-style-type: none"><li>1. Protein sorting and mechanisms of vesicular transport</li></ol> <p><b><u>Unit 4: Cytoplasmic organelles II</u></b></p> <ol style="list-style-type: none"><li>1. Centrosome: Structure and Functions</li></ol> <p><b><u>Unit 5: Nucleus</u></b></p> <ol style="list-style-type: none"><li>1. Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus</li><li>2. Chromatin: Euchromatin and Hetrochromatin and packaging (nucleosome)</li></ol> <p><b><u>Unit 4: Cytoplasmic organelles II</u></b></p> <ol style="list-style-type: none"><li>1. Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis, Mitochondrial Respiratory Chain, Chemi-osmotic hypothesis</li></ol> <p><b><u>Unit 7: Cell cycle and cancer</u></b></p> <ol style="list-style-type: none"><li>1. Cell cycle and its regulation</li><li>2. Cancer (Concept of oncogenes and tumor suppressor genes with special reference to p53, Retinoblastoma and Ras and APC.</li></ol> |

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| <p><b>April – May - June</b></p> | <p><b>Non-chordates II</b></p> <p><b><u>Unit 5: Mollusca</u></b></p> <ol style="list-style-type: none"> <li>1. General characteristics and Classification up to classes</li> <li>2. Nervous system and torsion in Gastropoda</li> <li>3. Feeding and respiration in <i>Pila</i> sp</li> </ol> <p><b><u>Unit 6: Echinodermata</u></b></p> <ol style="list-style-type: none"> <li>1. General characteristics and Classification up to classes</li> <li>2. Water-vascular system in Asteroidea</li> <li>3. Larval forms in Echinodermata</li> <li>4. Affinities with Chordates</li> </ol> <p><b>Cell Biology</b></p> <p><b><u>Unit 2: Plasma Membrane</u></b></p> <ol style="list-style-type: none"> <li>1. Ultra structure and composition of Plasma membrane: Fluid mosaic model</li> <li>2. Transport across membrane: Active and Passive transport, Facilitated transport</li> <li>3. Cell junctions: Tight junctions, Gap junctions, Desmosomes</li> </ol> <p><b><u>Unit 7: Cell cycle and cancer</u></b></p> <ol style="list-style-type: none"> <li>1. Cell cycle and its regulation</li> </ol> <p><b><u>Unit 6: Cell Division</u></b></p> <ol style="list-style-type: none"> <li>1. Cytoskeletal structures,</li> <li>2. Centrosome structure and function</li> <li>3. Accessory proteins of microfilament &amp; microtubule</li> <li>4. A brief idea about molecular motors</li> <li>5. Mitosis and Meiosis: Basic process and their significance</li> </ol> <p><b><u>Unit 8: Cell Signaling</u></b></p> <ol style="list-style-type: none"> <li>1. Cell signalling transduction pathways; Types of signaling molecules and receptors</li> <li>2. GPCR and Role of second messenger (cAMP)</li> <li>3. Extra cellular matrix-Cell interactions</li> <li>4. Apoptosis</li> </ol> |
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**Dept. of Zoology, Bankura Sammilani College**  
**MODULE BREAKUP OF THE SYLLABUS**  
**SESSION 2022-23**  
**CLASS : Sem-II (Zoology Honours)**  
**(Practical Paper : Core T3 and Core T4)**

| Month                                 | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| <b>January – February -<br/>March</b> | <p><b>Non-Chordates II: Coelomates</b></p> <p>1. Identification of following specimens:<br/> <i>a. Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria</i><br/> <i>b. Carcinoscorpius, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Peripatus</i><br/> <i>c. Chiton, Dentalium, Pila, Doris, Unio, Pinctada, Sepia, Octopus, Nautilus, Asterias, Ophiura, Echinus, Cucumaria and Antedon</i></p> <p><b>Cell Biology</b></p> <p>1. Drawing of ultrastructure of cell and different organelles (from photographs provided)</p> <p>2. Familiarization with the student’s light microscope and stereo-binocular microscope; preparation of aceto-orcein/ acetocarmine stain</p> <p>3. Preparation of temporary stained squash of onion root tip to study various stages of mitosis</p> |
| <b>April – May - June</b>             | <p><b>Non-Chordates II: Coelomates</b></p> <p>2. Identification of T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm</p> <p>3. Dissection, drawing and labelling of digestive system and septal nephridia of earthworm</p> <p>4. a. Mounting of mouth parts of <i>Periplaneta</i><br/> b. Dissection: digestive system and nervous system of <i>Periplaneta</i></p> <p>5. Submission of a Project Report on life cycle stages of any insect.</p> <p>6. Submission of Laboratory Note Book</p> <p><b>Cell Biology</b></p> <p>4. Preparation and identification of various stages of meiosis from grasshopper testis</p> <p>5. Preparation of permanent slides of Barr body from cheek epithelium</p> <p>6. Submission of Laboratory Note Book</p>                                                                                         |

**Dept. of Zoology, Bankura Sammilani College**

**MODULE BREAKUP OF THE SYLLABUS**

**SESSION 2022-23**

**CLASS : Sem-IV ( Zoology Honours)**

**(Theory Paper: Core T8, Core T9 and Core T10)**

| <b>Month</b>                          | <b>Topic</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| <b>January – February -<br/>March</b> | <p><b>Core T8 - Comparative Anatomy of Vertebrates</b></p> <p><b><u>Unit 4: Respiratory System</u></b><br/>Respiratory organs in fish, amphibian, and birds</p> <p><b><u>Unit 5: Circulatory System</u></b><br/>Comparative account of heart and aortic arches</p> <p><b><u>Unit 7: Nervous System</u></b><br/>Comparative account of brain, Cranial nerves in mammals</p> <p><b><u>Unit 2: Skeletal System</u></b><br/>General idea of axial and appendicular skeleton; Basic idea of jaw suspension and visceral</p> <p><b><u>Unit 3: Digestive System</u></b><br/>Ruminating stomach; dentition in mammals</p> <p><b>Core T9 - Animal Physiology: Life Sustaining Systems</b></p> <p><b><u>Unit 3: Physiology of Circulation</u></b><br/>Components of Blood and their functions; Structure and functions of haemoglobin<br/>Haemostasis; Blood clotting system<br/>Haemopoiesis; Basic steps and its regulation<br/>Blood groups; ABO and Rh factor</p> <p><b><u>Unit 4: Physiology of Heart</u></b><br/>. Structure of mammalian heart, Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses<br/>Cardiac Cycle and cardiac output<br/>. Blood pressure and its regulation</p> <p><b><u>Unit 2: Physiology of Respiration</u></b><br/>Mechanism of Respiration, transport of Oxygen and Carbon dioxide in blood, Dissociation curves and the factors influencing it, Carbon monoxide poisoning</p> <p><b>Core T 10 Immunology</b></p> <p><b><u>Unit 1: Overview of Immune System</u></b></p> |

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|                           | <p>Basic concepts of health and diseases, Historical perspective of Immunology, Cells and organs of the Immune system</p> <p><b><u>Unit 2: Innate and Adaptive Immunity</u></b></p> <p>Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).</p> <p><b><u>Unit 3: Antigens</u></b></p> <p>Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes</p> <p><b><u>Unit 4: Immunoglobulins</u></b></p> <p>Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays (ELISA and RIA), Hybridoma technology, concept of monoclonal antibody</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p>April – May - June</p> | <p><b>Core T8 - Comparative Anatomy of Vertebrates</b></p> <p><b><u>Unit 1: Integumentary System</u></b></p> <p>Structure, function and derivatives of integument in amphibian, birds and mammals</p> <p><b><u>Unit 6: Urinogenital System</u></b></p> <p>Archinephros, Pronephros, Mesonephros and Metanephros<br/>Evolution of urinogenital ducts, Types of mammalian uteri</p> <p><b><u>Unit 8: Sense Organs</u></b></p> <p>Classification of receptors</p> <p><b>Core T9 - Animal Physiology: Life Sustaining Systems</b></p> <p><b><u>Unit 5: Thermoregulation &amp; Osmoregulation</u></b></p> <p>Physiological classification based on thermal biology.<br/>Osmoregulation in aquatic vertebrates<br/>Extrarenal osmoregulatory organs in vertebrates</p> <p><b><u>Unit 6: Renal Physiology</u></b></p> <p>Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance</p> <p><b><u>Unit 1: Physiology of Digestion</u></b></p> <p>Structural organisation and functions of Gastrointestinal tract and Associated glands: Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids; Digestive enzymes</p> <p><b>Core T 10 Immunology</b></p> <p><b><u>Unit 9: Immunology of diseases</u></b></p> |

Malaria, Filariasis, and Tuberculosis

**Unit 7: Complement System**

Components and pathways of complement activation.

**Unit 8: Hypersensitivity**

Gell and Coombs' classification and brief description of various types of hypersensitivities.

**Unit 10: Vaccines**

Various types of vaccines. Active & passive immunization (Artificial and natural).

**Unit 5: Major Histocompatibility Complex**

Structure and functions of MHC molecules.

Structure of T cell Receptor and its signalling

**Unit 6: Cytokines**

Types, properties and functions of cytokines.

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MODULE BREAKUP OF THE SYLLABUS

SESSION 2022-23

CLASS : Sem-IV (Zoology Honours)

(Practical Paper : Core T8, Core T9 and Core T10)

| Month                         | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| January – February -<br>March | <p><b>Core T8 - Comparative Anatomy of Vertebrates</b></p> <ol style="list-style-type: none"><li>1. Study of disarticulated skeleton of Toad, Pigeon and Guineapig (Vertebrae, Pectoral girdle, Pelvic girdle)</li><li>2. Dissection of carp: Circulatory system, Brain, pituitary, urinogenital system</li><li>5. Study of disarticulated skeleton of Toad, Pigeon and Guineapig (Skull,)</li><li>1. Demonstration of Carapace and plastron of turtle</li><li>1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs</li></ol> <p><b>Core T9 - Animal Physiology: Life Sustaining Systems</b></p> <p>Determination of ABO Blood group</p> <ol style="list-style-type: none"><li>4. Recording of blood pressure using a sphygmomanometer</li></ol> <p><b>Core T 10 Immunology</b></p> <ol style="list-style-type: none"><li>1. Enumeration of red blood cells and white blood cells using haemocytometer.</li><li>2. Demonstration of lymphoid organs.</li><li>1. Histological study of spleen, thymus and lymph nodes through slides/ photographs</li></ol> |
| April – May - June            | <p><b>Core T8 - Comparative Anatomy of Vertebrates</b></p> <ol style="list-style-type: none"><li>6. Identification of mammalian skulls: One herbivorous (Guineapig) and one carnivorous (Dog) animal</li><li>7. Dissection of carp: Circulatory system, Brain, pituitary, urinogenital system.</li><li>3. Dissection of carp: Circulatory system, Brain, pituitary, urinogenital system</li></ol> <p><b>Core T9 - Animal Physiology: Life Sustaining Systems</b></p> <ol style="list-style-type: none"><li>1. Estimation of haemoglobin using Sahli's haemoglobinometer</li><li>2. Preparation of haemin and haemochromogen crystals.</li></ol> <p><b>Core T 10 Immunology</b></p> <ol style="list-style-type: none"><li>2. Preparation of stained blood film to study various types of blood cells.</li></ol>                                                                                                                                                                                                                                                                             |

**Dept. of Zoology, Bankura Sammilani College**

**MODULE BREAKUP OF THE SYLLABUS**

**SESSION 2022-23**

**CLASS : Sem-VI ( Zoology Honours)**

**(Theory Paper: Core T13, T14, DSE3 & DSE4)**

| <b>Month</b>                          | <b>Topic</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <b>January – February -<br/>March</b> | <p><b>Core T 13 Developmental Biology</b></p> <p>Unit 1: Introduction<br/>Basic concepts: Phases of Development, Cell cell interaction, Differentiation and growth, Differential gene expression</p> <p>Unit 2: Early Embryonic Development<br/>Types of eggs, Egg membranes; Fertilization (External and Internal), prevention of polyspermy; Planes and patterns of cleavage;</p> <p>Unit 3: Late Embryonic Development<br/>Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in human, Placenta (Structure, types and functions)</p> <p>Unit 4: Post Embryonic Development<br/>Development of brain and Eye in Vertebrate<br/>Brief idea of regeneration</p> <p>Unit 2: Early Embryonic Development<br/>Gametogenesis; Spermatogenesis, Oogenesis;</p> <p><b>Core T 14 Evolutionary Biology</b></p> <p><b>Unit 1</b><br/>Basic concept of origin of life, Evolution of life forms and present state of biodiversity</p> <p><b>Unit 2</b><br/>Historical review of Evolutionary concepts, Lamarckism, Darwinism and Neo Darwinism</p> <p><b>Unit 6</b><br/>Species concept, Isolating mechanisms, modes of speciation<br/>Adaptive radiation, macroevolution (exemplified by Galapagos finches), microevolution</p> <p><b>Unit 7</b><br/>Basic concept of extinctions, Back ground and mass extinctions (causes and effects), detailed example of K-T extinction</p> <p><b>Unit 3</b></p> |



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|                                  | <p>1. Geological time scale, Fossil records of hominids (from Australopithecus to Homo sapiens), evolution of horse</p> <p>2. Neutral theory of molecular evolution, Molecular clock</p> <p><b>DSE T3 – Endocrinology</b></p> <p><b>Unit 4: Regulation of Hormone Action</b></p> <p>3. Estrous cycle in rat and menstrual cycle in human</p> <p>4. Role of Vasopressin &amp; Oxytocin. Hormonal regulation of parturition</p> <p><b>Unit 3: Peripheral Endocrine Glands</b></p> <p>1. Structure, Hormones, Functions and Regulation : Thyroid gland, Parathyroid, Adrenal, Pancreas, Ovary and Testis</p> <p>2. Hormones in homeostasis; Disorders of endocrine glands</p> <p><b>DSE T4 Parasitology</b></p> <p><b>Unit 3: Parasitic Platyhelminthes</b></p> <p>Study of <i>Schistosoma haematobium</i>, <i>Taenia sajinata</i> : Morphology, Life Cycle, Epidemiology, Pathogenicity and control.</p>                                                                                                                                                                                                                                                   |
| <p><b>April – May - June</b></p> | <p><b>Core T 13 Developmental Biology</b></p> <p>Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers</p> <p>Unit 5: Implications of Developmental Biology</p> <p>Teratogenesis: Teratogenic agents and their effects on embryonic development; In vitro fertilization, Stem cell (ESC), Basic concept of Amniocentesis.</p> <p><b>Core T 14 Evolutionary Biology</b></p> <p><b>Unit 8</b></p> <p>Origin and Evolution of Man, comparative account of hominid characteristics and primate characteristics</p> <p><b>Unit 9</b></p> <p>Phylogenetic trees, Convergent &amp; Divergent evolution</p> <p><b>Unit 4</b></p> <p>Sources of evolutionary variations: Heritable variations and their role in evolution</p> <p><b>Unit 5</b></p> <p>1. Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application of law to bi-allelic Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, types of selection, selection coefficient, mode of selection heterozygous superiority).</p> |

2. Genetic Drift mechanism (founder's effect, bottleneck phenomenon)
3. Role of migration and mutation in changing allele frequencies.

### **DSE T3 – Endocrinology**

#### **Unit 2: Epiphysis, Hypothalamo-hypophysial Axis**

1. Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction.
2. Structure and functions of hypothalamus and Hypothalamic nuclei, Regulation of neuroendocrine glands, Feedback mechanisms

#### **Unit 1: Introduction to Endocrinology**

General idea of Endocrine systems, Classification, Characteristic and Transport of Hormones, Neurosecretions and Neurohormones;

#### **Unit 2: Epiphysis, Hypothalamo-hypophysial Axis**

3. Structure of pituitary gland, its hormones and their functions, Hypothalamo-hypophysial portal system, disorders of pituitary gland.

#### **Unit 4: Regulation of Hormone Action**

1. Mechanism of action of steroidal, non-steroidal hormones with receptors
2. Bioassays of hormones using RIA & ELISA

### **DSE T4 Parasitology**

#### **Unit 1: Introduction to Parasitology**

Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) and parasitic disease of human; Host parasite relationship

#### **Unit 2: Parasitic Protozoans**

Study of *Giardia Intestinalis*, *Trypanosoma gambiense*, *Leishmania donovani* : Morphology, Life Cycle, Epidemiology, Pathogenicity, and control.

#### **Unit 4: Parasitic Nematodes**

Study of *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria bancrofti* and *Trichinella spiralis*: Morphology, Life Cycle, Epidemiology, Pathogenicity and control  
Nematode plant interaction; Gall formation

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MODULE BREAKUP OF THE SYLLABUS

SESSION 2022-23

CLASS : Sem-VI (Zoology Honours)

(Practical Paper : Core T13, T14, DSE3 & DSE4)

| Month                         | Topic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| January – February -<br>March | <p><b>Core T 13 Developmental Biology</b></p> <ol style="list-style-type: none"><li>1. Identification of whole mounts of developmental stages of chick through permanent slides: 24, 48 and 72 hours of incubation.</li><li>2. Identification of the developmental stages and life cycle of <i>Drosophila</i> from stock culture.</li></ol> <p><b>Core T 14 Evolutionary Biology</b></p> <ol style="list-style-type: none"><li>1. Identification of major group of fossils from models/ pictures (Petrified fossil, molds, casts, carbon film, trace fossil)</li><li>2. Study of homology and analogy from suitable specimens (Birds and mammals).</li></ol> <p><b>DSE T3 – Endocrinology</b></p> <ol style="list-style-type: none"><li>1. Dissect and display of Endocrine glands in laboratory bred rat.</li><li>2. Identification of all the endocrine glands, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Testis, Ovary through permanent slides.</li></ol> <p><b>DSE T4 Parasitology</b></p> <ol style="list-style-type: none"><li>1. Identification of life cycle stages of <i>Giardia sp.</i>, <i>Trypanosoma sp.</i>, <i>Leishmania sp</i> through permanent slides/micro photographs</li><li>2. Identification of adult and life stages of <i>Schistosoma sp.</i>, through permanent slides/micro photographs</li><li>3. Identification of adult and life stages of <i>Ancylostoma sp.</i>, through permanent slides/micro photographs</li></ol> |
| April – May - June            | <p><b>Core T 13 Developmental Biology</b></p> <ol style="list-style-type: none"><li>3. Identification of different sections of placenta (epitheliochorial, endotheliochorial and hemochorial) (photomicrograph/ slides)</li><li>4. Project report on <i>Drosophila</i> culture/chick embryo development</li></ol> <p><b>Core T 14 Evolutionary Biology</b></p> <ol style="list-style-type: none"><li>3. Study and verification of Hardy-Weinberg Law by chi square analysis</li><li>4. Graphical representation and interpretation of data of height/ weight of a sample of 50 humans in relation to their age and sex.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**DSE T3 – Endocrinology**

3. Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland
4. Demonstration of hormone assay through ELISA from teaching Kit

**DSE T4 Parasitology**

4. Identification of plant parasitic root knot nematode, *Meloidogyne* through permanent slides/micro photographs
5. Identification of *Pediculus sp*, and *Cimex sp* through permanent slides/ photographs
6. Identification of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market]
7. Identification of nematode/cestode parasites from the intestines of fowl
8. Submission of a brief report on any parasite on vertebrates

- Submission of Laboratory Note Book.