SYLLABUS FOR
THREE-YEAR DEGREE COURSE
IN ZOOLOGY HONOURS
(With effect from the session 2014 - 2015)

THE UNIVERSITY OF BURDWAN
BURDWAN, 713104
WEST BENGAL, INDIA
New Syllabus for Three-Year Degree Course in Zoology Honours accepted in the meeting of UGBS held on 11th February, 2014.

(Dr. Anupam Basu)
Chairman,
UGBS in Zoology,
The University of Burdwan

With the help and active participation of Members of the Committee for the Preparation of New Syllabus:
1. Dr. Anupam Basu, Head of the Deptt. Of Zoology, University of Burdwan & Chairman.
2. Dr. Padmanava Chakraborty, Deptt. Of Zoology, University of Burdwan & Advisor.
5. Dr. Sanjay Mandal, Member, Deptt. Of Zoology, B. B. College. Asansol.
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TOTAL MARKS : 800

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<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>100+100</td>
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<td>PART – II</td>
<td>3</td>
<td>1</td>
<td>150+50</td>
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<td>PART – III</td>
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<td>TOTAL</td>
<td>7</td>
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**Part – I**

<table>
<thead>
<tr>
<th>Paper - I</th>
<th>Theory</th>
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<tr>
<td>(F.M. 50)</td>
<td>Systematics; Animal Structures and Functions (Non-Chordata).</td>
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<td>(F.M. 50)</td>
<td>Animal Structures and Functions (Chordata).</td>
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<td>(F.M. 50)</td>
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<td>Paper - IV</td>
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<td>(F.M. 50)</td>
<td>Chordata.</td>
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**Part – II**

<table>
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<th>Paper - V</th>
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<tr>
<td>(F.M. 50)</td>
<td>Zoogeography, Adaptation and Evolutionary Biology.</td>
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<tr>
<td>Paper - VI</td>
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<tr>
<td>(F.M. 50)</td>
<td>Cell Biology and Genetics.</td>
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<td>Paper - VII</td>
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<tr>
<td>(F.M. 50)</td>
<td>Biochemistry, Biological tools &amp; techniques and Physiological processes.</td>
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<tr>
<td>Paper - VIII</td>
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<tr>
<td>(F.M. 50)</td>
<td>Practical works: Cell Biology, Genetics, Physiology and Biochemistry.</td>
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**Part – III**

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<tr>
<th>Paper – IX</th>
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<tr>
<td>(F.M. 100)</td>
<td>Ethology &amp; Biodiversity conservations, Ecology, Biometry, Applied Zoology, Microbiology, Parasitology and Medical Entomology.</td>
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<tr>
<td>Paper - X</td>
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<tr>
<td>(F.M. 100)</td>
<td>Molecular Biology &amp; Biotechnology, Human Immunology, Developmental Biology and Endocrinology.</td>
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<tr>
<td>Paper - XI</td>
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<tr>
<td>(F.M. 100)</td>
<td>Practical works: Ecology, Applied Zoology and Field-based study/Review work/ Term paper.</td>
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<tr>
<td>Paper – XII</td>
<td>Practical works: Histology, Endocrinology, Statistical analysis, Microbiology and Parasitology.</td>
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<tr>
<td>(F.M. 100)</td>
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<tr>
<td></td>
<td>and Visit to agricultural/sericulture/fishery /poultry farm/Marine or forest ecosystem.</td>
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THEORETICAL PAPERS

Paper – I  
Theoretical Paper: Systematics; Animal Structures and Functions (Non-Chordata): Total 60 classes

[Questions are to be set covering the entire syllabus; 7 questions each of 2 marks and 4 to be answered; 5 questions each of 6 marks and 3 to be answered; 4 questions of 12 marks and 2 to be answered]

Group – A : Systematics: (10 Classes)
1. Definitions: Classification, Systematic and Taxonomy; Hierarchy, Taxonomic types.
2. General idea of Codes of Zoological Nomenclature; Principle of priority; Synonym and Homonym.
3. Basic idea of Cytological and Biochemical taxonomy.

Group – B : Non-Chordate Diversity, Relationships And Systematics (15 Classes)
1. Classificatory schemes of the living world - Six-Kingdom concept; Outline classification of Sub-kingdom Protozoa (up to Phyla; examples with Scientific names) (Levine et al., 1980) and Minor Phyla.
2. Classification with characteristic features and examples with Scientific names of (upto Classes)
   a. Phylum Nematoda; Phylum Arthropoda - as per Ruppert and Barnes (7th Ed. 2003).
   b. Up to Sub-classes: Phylum Cnidaria, Phylum Platyhelminthes, Phylum Mollusca and Phylum Echinodermata - as per Ruppert and Barnes (7th Ed. 2003).
   c. Up to Orders: Phylum Porifera - as per Hyman (1940); and Phylum Annelida - as per Ruppert and Barnes (7th Ed. 2003).
3. Origin of Metazoa; Coelom, Metamerism and Symmetry.

Group – C : Type study of Non-Chordate Animals: (25 Classes)
1. Paramoecium (Locomotion, Osmoregulation, Reproduction).
2. Sycon (Cell types, Spicules,).
3. Earthworm (General Morphology, Reproductive System).
4. Periplaneta (General Morphology, Excretory System, Reproductive System).
5. Pila (Torsion, Feeding, Respiratory System).
6. Asterias (General Morphology, Water vascular System).

Group – D : Specialized Features of Non-Chordate Animals (10 Classes)
2. Polymorphism in Siphonophora and Social insect (Honey bee).
3. Formation, Types and Distribution of Coral Reefs.
4. Metamorphosis in Insects.
Suggested Readings:

Paper – II  Theoretical Paper: Animal Structures and Functions (Chordata): Total 60 classes

[Questions are to be set covering the entire syllabus; 7 questions each of 2 marks and 4 to be answered; 5 questions each of 6 marks and 3 to be answered; 4 questions of 12 marks and 2 to be answered]

Group - A: Chordate Diversity and Relationships (15 Classes)

1. Classification with characteristic features and examples with Scientific names of:
   b) Up to Order: Superclass Agnatha - as per J. Z. Young (1981).
   c) Up to Sub-Classes: Chondrichthyes and Osteichthyes - as per Nelson (2006); and Aves - as per Pough(9th, Edition).
   d) Up to living Orders: Amphibia - as per Duellman and Trueb (1986); Reptilia and Mammalia - as per J. Z. Young (1981).

2. Anatomical peculiarities, Distribution and Evolutionary signifcance of Dipnoi.

3. Anatomical peculiarities, Distribution and Importance of Sphenodon.
Group - B: Type Study of Chordate Animals (30 Classes)

1. Branchiostoma (Chordate Features, Feeding, Circulatory System).
2. Labeo (General Morphology, Circulatory, Respiratory System).
3. Toad (General Morphology, Skeletal structures, Circulatory, Urinogenital System).
4. Calotes (General Morphology, Circulatory, Excretory System).
6. Cavia (Endoskeleton, Brain & Cranial nerves).

Group - C: Specialized Features of Chordate Animals (15 Classes)

1. Biting apparatus & Biting mechanism; Composition & Types of Venom in Snakes.
2. Retrogessive (in Ascidia) and Progressive (in Toad/Frog) metamorphosis; Neoteny and Paedogenesis.
3. Aerodynamics of Avian flight.
4. Echolocation in Micro chiropterans and Cetaceans.
5. Glands, Hair and Horn in Mammals.

Suggested Readings:
Young, J. Z. (1981). The Life of Vertebrates. 3rd Ed. ELBS.
Practical Paper: Non-Chordata: 50 Marks: Time: 4 hours

Questions are to be set with Non-chordate specimens: One Major dissection (12 marks), One Minor dissection (8 marks), One Preparation/staining-mounting (5 marks), Identification of Five specimens with reasons (5 X 4 = 20) and Laboratory Note Book (5 marks)

Group - A: Non-Chordate Major Dissections
1. Earthworm : Reproductive System
2. Cockroach : Male Reproductive System

Group - B: Non-Chordate Minor Dissections
1. Earthworm : Nervous System
2. Cockroach : Salivary apparatus, Nervous System, Female Reproductive System

Group - C: Non-Chordate Preparations/Staining-Mounting
1. Earthworm : Setae
2. Cockroach : Mouthparts

Group - D: Non-chordate specimen identifications with reasons
(As per Classification Schemes of theoretical paper)
Euglena, Paramoecium, Euspongia, Scypha, Obelia, Aurelia, Physalia, Porpita, Sea-Anemone, Fasciola, Ascaris, Chaetopterus, Aphrodite, Sabella, Eupagurus, Apus, Balanus, Hippa, Squilla, Oniscus, Belostoma, Buthus, Mantis, Chiton, Patella, Doris, Pinctada, Mytilus, Sepia, Loligo, Octopus, Ophiura, Astropecten, Antedon, Balanoglossus.

Laboratory Note Book must be prepared on day-to-day basis and should be signed by the concerned teacher immediately after the laboratory work. The Laboratory Note Book should contain all the items in the syllabus and must be submitted on the day of examination.
Paper – IV  **Practical Paper: Chordata: 50 Marks; Time: 4 hours**

[Questions are to be set with Chordate specimens: One Major dissection (12 marks), One Minor dissection (8 marks), One Preparation/staining-mounting (5 marks), Identification of Five specimens with reasons (5 X 4 = 20) and Laboratory Note Book (5 marks)]

**Group - A: Chordate Major Dissections**
- a. Indian Major Carp (any one; 6-8”) : IXth and Xth Cranial Nerves - Origin and Distributions.
- b. Fowl : Vth Cranial Nerves - Origin and Distributions.

**Group - B: Chordate Minor Dissections**
- a. Indian Major Carp (any one; 6-8”) : Brain.
- b. Fowl : Brain and Hyoid apparatus.

**Group - C: Chordate Preparations/Staining-Mounting**
- b. Mounting of Weberian ossicles (carp).
- c. Pecten of fowl.

**Group - D: Chordate specimen identifications with reasons:**
(As per Classification Schemes of theoretical paper)
Ascidia, Doliolum, Branchiostoma, Petromyzon, Myxine, Ammocete larva, Torpedo, Hippocampus, Heteropneustes, Clarias, Exocoetus, Syngnathus, Tadpole, Rana, Ambystoma, Rhacophorus, Necturus, Pleurodeles (=Tylototriton), Draco, Typhlops, Chamaeleo, Naja, Ptyas, Daboia (=Vipera), Hydrophis, Psittacula, Passer, Pycnonotus, Alcedo, Pteropus, Funambulus, Suncus.

**Group - E: Identification of bones with reasons**
1. Skull: Toad, Varanus, Columba, Cavia, Old world monkey.
2. Appendicular bones: Columba, Cavia.

Laboratory Note Book must be prepared on day-to-day basis and should be signed by the concerned teacher immediately after the laboratory work. The Laboratory Note Book should contain all the items in the syllabus and must be submitted on the day of examination.
PART - II

| Paper - V: Zoogeography, Adaptation and Evolutionary Biology: | 50 marks | Time 2 hours |
| Paper - VI: Cell Biology and Genetics: | 50 marks | Time 2 hours |
| Paper - VII: Biochemistry, Biological Tools & Techniques and Physiology: | 50 marks | Time 2 hours |
| Paper - VIII: Practical works: | 50 marks | Time 4 hours |

THEORETICAL PAPERS

Paper – V

Theoretical Paper: Zoogeography, Adaptation and Evolutionary Biology:

[Questions are to be set covering the entire syllabus; 7 questions each of 2 marks and 4 to be answered ; 5 questions each of 6 marks and 3 to be answered ; 4 questions of 12 marks and 2 to be answered]

Group - A: Zoogeography and Adaptation (30 Classes)

1. Geological Time Scale (Schematic).
2. Zoogeographical Realms with examples; Barriers, Dispersals and their impact on Animal Distribution.
3. Adaptive features (Morphological and Physiological) of Aquatic vertebrates (Fish and Whale).

Group - B: Evolutionary Biology (30 Classes)

1. Origin of Life - Chemical basis and Experiments.
2. Darwinism and Outline idea of Modern Synthetic Theory of Evolution.
3. Isolating mechanisms and Modes of speciation.
4. Species Concept (Biological & Evolutionary).
5. Hardy-Weinberg equilibrium and factors affecting it.

Suggested Readings:


Page 9 of 20
Theoretical Paper: Cell Biology and Genetics: Total 60 classes

[Questions are to be set covering the entire syllabus; 7 questions each of 2 marks and 4 to be answered; 5 questions each of 6 marks and 3 to be answered; 4 questions of 12 marks and 2 to be answered]

Group - A: Cell Biology (30 Classes)
1. Ultra structure and Outline Functions of Plasmamembrane.
   Mitochondria, Golgi complex, Endoplasmic reticulum and Ribosome.
2. Nucleic Acids: Chemical and Physical structure.
4. Cell cycle, Mitotic and Meiotic cell divisions and their Significance.
5. Spindle apparatus and Synaptonemal complex.

Group - B: Genetics (30 Classes)
1. Mendelian Principles; Extensions to Mendel’s Law.
2. Allele: Types, Multiple alleles, ABO Blood Group (with simple problems).
3. Linkage, Crossing over (Holliday model).
5. Simple Mendelian traits in Man and Modes of Autosomal Inheritance.
6. Inheritance of Sex-linked traits in Drosophila and Man.
7. Sex Determination in Drosophila and Man.

Suggested Readings:

�্যাটিচার্স, কোকসডাউন (২০১০)। প্রাদীক্ষিক, চুক্তিসভ্যতা, বুকস অ্যাং স্য্যাল্মোডা (ডেইকে) লিমিটেড, কোলাবারা।
সাইটি, শাক্তশালী, মিউমপার্স, চিলাছায়া, (২০০৫)। কমবলীন প্রাদীক্ষিক। নিউ স্টেটল রুক এডজলি (জাইন্ট) লিমিটেড, কলকাতা।
রাম, বিজ্ঞান, ভ্যাটিচার্স, বুকস অ্যাং স্য্যাল্মোডা, সুস্থ, বৃদ্ধদেশ, (২০০১)। প্রাদীক্ষিক। প্রতিযোগী, বুকস, ধ্রুপদী ভাষা, অধিন প্রক্রিয়া, কলকাতা।
চুক্তিসভ্যতা, নির্দেশিত (২০০৫)। প্রতিযোগী প্রাদীক্ষিক। প্রথম ভাষা, কলকাতার সভ্যতা, বুকস অ্যাং স্য্যাল্মোডা (ডেইকে) লিমিটেড, কলকাতা।
চুক্তিসভ্যতা, অধিন প্রক্রিয়া, (২০২১)। কোকসডো ও মার্চলোক, প্রথম ভাষা, প্রথম পত্তনের রাজ্য গুটির পৃষ্ঠ, কলকাতা।
গোবরিয়া, বুকস অ্যাং স্য্যাল্মোডা, (২০১২)। কোকসডো ও মার্চলোক, প্রথম ভাষা, প্রথম পত্তনের রাজ্য গুটির পৃষ্ঠ, কলকাতা।
২০, সৃষ্টিধারা (২০০১)। সাইটি অ্যাং রুকস সভ্যতা, পাইকুল গুটির পৃষ্ঠ, কলকাতা।
[Questions are to be set covering the entire syllabus; 7 questions each of 2 marks and 4 to be answered; 5 questions each of 6 marks and 3 to be answered; 4 questions of 12 marks and 2 to be answered]

Group - A: Biochemistry, Biological tools & techniques (25 Classes)
1. Definitions with examples from Biological systems of Optical Isomerism, Hydrophobic and Hydrophilic interactions, Hydrogen bond, S-S bond, Van der Waal’s force; pH and Buffer.
4. Enzymes - Classes; Kinetics and Factors affecting enzyme action.
5. Microscopy - Light (Bright-field, Dark-field and Phase contrast) and Electron (SEM and TEM).

Group - B: Metabolism and Physiological Processes: (35 Classes)
1. Metabolism of Carbohydrates - Glycolysis, Pentose phosphate pathway and Gluconeogenesis.
2. Metabolism of Amino acids; Transamination and Oxidative and Non-oxidative Deamination.
5. Role of Hemoglobin in O2 and CO2 transport in Man.
6. Physiology of Nerve impulse propagation and Muscular contraction.

Suggested Readings:
PRACTICAL PAPER

Paper – VIII Practical Paper: 50 Marks: Time: 4 hours

[Questions are to be set with TWO experiments each of 15 marks, each from Group – A (Preparation of Mitotic/Meiotic stage, drawing of a stage under microscope field and its identification) and Group – B (Estimation of total Carbohydrate/Total Protein); Next ONE experiment of 5 marks from Group – B (Enzyme/DC); Pedigree analysis with comment (10 marks); Laboratory Note Book (5 marks).]

Group - A: Cell Biology & Genetics:
1. Preparation and Identification of Mitotic stages from Onion Root-tip.
2. Preparation and Identification of Meiotic stages from Grass-hopper Testis.
3. Human Pedigree Chart analysis.

Group - B: Physiology and Biochemistry:
1. Quantitative Estimation by Colorimetric Methods of Total Carbohydrate (as per Umbreit et al., 1958) and Total Protein (as per Lowry et al, 1951).

Laboratory Note Book must be prepared on day-to-day basis and should be signed by the concerned teacher immediately after the laboratory work. The Laboratory Note Book should contain all the items in the syllabus and must be submitted on the day of examination.
PART – III

Theoretical Papers

Paper - IX: Ethology, Biodiversity Conservations, Ecology, Biometry, Applied Zoology, Microbiology, Parasitology, Medical entomology : 100 marks Time 4 hours

Paper - X: Molecular Biology, Biotechnology, Immunology, Developmental Biology, Endocrinology: 100 marks Time 4 hours

Paper - XI: Practical works: 100 marks Time 6 hours

Paper - XII: Practical works: 100 marks Time 6 hours

THEORETICAL PAPERS

Paper - IX:

Theoretical Paper: Unit – I: Ethology, Biodiversity conservations, Ecology, Biometry:

Unit – II: Applied Zoology, Microbiology, Parasitology, Medical entomology: Total 120 classes

[Questions are to be set covering the entire syllabus; 14 questions (7 from each UNIT) each of 2 marks and 8 to be answered; 10 questions (5 from each UNIT) each of 6 marks and 6 to be answered; 8 questions (4 from each UNIT) of 12 marks and 4 to be answered]

UNIT – I: 50 Marks

Group : A : Ethology and Biodiversity Conservations (30 Classes)

2. Elements of Sociobiology: Selfishness, Cooperation, Altruism and Kinship.
3. Mating systems and their Significance.
4. Biodiversity: Definition, levels, values, causes of depletion; In-situ and Ex-situ conservation, Bio-diversity Hotspots and Mega diversity countries; Biodiversity Act; Biopiracy.
5. Endangered and Critically Endangered Vertebrate Wildlife of India; Management Strategies with special reference to Tiger and Rhinoceros in India; Wildlife Protection Laws.

Group – B: Ecology (30 Classes)

1. Concept of Ecosystems: Components, Basic properties and Principles; Concept of Limiting Factor-impact of Temperature on biota.
2. Energy Flow through trophic levels and Ecological efficiencies.
5. Ecological Succession: Concept of Community change, Theories of Climax, Models of Succession.
6. Salient features (characteristics and importance) of Indian Rain Forest.

Group - C: Biometry: (15 Classes)

1. Definition and importance of Biometry in Zoology.
5. Test of Significance (Student’s t-Test).
6. Goodness of fit (Chai-Square Test).
UNIT – II : 50 Marks

Group – A: Applied Zoology: (20 Classes)
1. Pond Management; Induced Breeding and Composite culture of Carp.
2. Sericulture - Rearing and Cocoon production; Diseases and Pests and their Control in Bombyx mori.
3. Poultry - Major Fowl Breeds; Deep Litter System of Rearing; Common diseases and their Control measures.
4. Animal Husbandry - Types and Distribution of Cattle Breeds (Cow only) in India; Artificial Insemination: Merits and Demerits.
5. Pest Biology - Pests and their Control - Cultural, Mechanical, Chemical, Biological; Integrated Pest Management; Bionomics, Damage and Control measures of Nilaparvata, Apion, Sitophilus.

Group – B: Microbiology, Parasitology and Medical Entomology (25 Classes)
1. Types of Microbes; Normal flora in Man and their Protective role
2. Basic structure of Bacteria.
3. Interactions among Organisms: Phoresis, Commensalisms, Parasitism and Mutualism
4. Parasites and Hosts: types and examples; Host-Parasite Interactions: Morphological and Physiological changes.
5. Morphology, Life-cycle, Pathogenicity and Control of Giardia intestinalis, Leishmania sp, Ascaris lumbricoides and Wuchereria bancrofti.

Suggested Readings:


Timbrell, J. (2002). Introduction to Toxicology. 3rd Ed. Taylor & Francis, London.


Theoretical Paper: Unit – I : Molecular Biology & Biotechnology, Human Immunology; Unit – II : Developmental Biology and Endocrinology: Total 120 classes

[Questions are to be set covering the entire syllabus; 14 questions (7 from each Unit) each of 2 marks and 8 to be answered; 10 questions (5 from each Unit) each of 6 marks and 6 to be answered ; 8 questions (4 from each Unit) of 12 marks and 4 to be answered]

UNIT - I : 50 Marks

Group – A : Molecular Biology and Biotechnology: (40 Classes)
1. DNA Replication - Semi-conservative DNA replication; Factors involved and Replication mechanism in *E. coli*.
2. Chromosomal Aberrations (both Structural & Numerical); Down, Turner, Klinefelter and Cri-du-Chat syndromes.
3. Transcription in *Escherichia coli*.
4. Transcription in Eukaryotes.
5. Concept of Genetic Code.
6. Translation in *Escherichia coli* - Mechanism and Factors involved.
7. Regulation of Gene expression - Operon Concept (Inducible and Repressible operon).
9. Genetic Disorders and Diseases in Man - PKU, Albinism, Sickle-cell anaemia and Thalassemia
10. Basic concept of Genetic Engineering; Recombinant DNA and Cloning; DNA Fingerprinting and its Application.

Group – B: Human Immunology (20 Classes)
1. Immunity: Innate and Adaptive.
2. Immunoglobulin classification.
3. Cells involved in Acquired Immune System (Outline idea).
4. Basic Structures of Antigen and Antibody.

UNIT - II : 50 Marks

Group – A : Developmental Biology: (40 Classes)
1. Gametogenesis - Germ cell migration, Spermatogenesis and Oogenesis.
2. Ultra structure of Sperm and Egg; Physical and Biochemical events in Fertilization.
3. Egg-types and role of yolk in Cleavage.
4. Morphogenetic movement; Gastrulation in Frog and Chick; Concept of Fate Map.
6. Development of Extra embryonic membranes in Chick; Types of Placenta in Mammals.
7. Organogenesis - Development of Eye and Heart in Chick.
8. Regeneration - Basic mechanism.

Group – B : Endocrinology: (20 Classes)
1. General idea of Invertebrate and Vertebrate Endocrine systems (Name and Locations of Endocrine Glands, Name of hormones and Chemical nature).
3. Brief descriptions of Major Endocrine disorders in Human (Gigantism, Acromegaly, Cretinism, Myxoedema, Goiter, Cushing’s disease & Addison’s disease).
Suggested Readings:

Negi (2010). Introduction to Endocrinology. PHI Learning Private Ltd.
Paper – XI : Practical Paper 100 Marks : Time: 6 hours

[Questions are to be set with Three experiments : A) Micro measurement and Drawing (15 marks), B) Estimation of DO/free CO\(_2\) (15 marks), C) Determination of Soil pH (10 marks); Identification with reasons of any Four Pests and any Four Fishes (8X5=40 marks); Laboratory Note Book (5 marks); Brief presentation of Field-based Study/Review work (15 marks)]

Group - A: Ecology :
1. Use of Micrometers and Camera Lucida (Prism-type) in measuring and drawing of Zooplankton.
2. Quantitative estimation of Dissolved O\(_2\) (Winkler’s method) and Free CO\(_2\) (APHA method) of natural water by titrimetric methods.

Group - B: Applied Zoology:
1. Identification of ectoparasites and pests (up to Order and Generic characters): Menopon, Pediculus, Xenopsylla, Scirpophaga, Leptocorisa, Nilaparvata, Apion, Spodoptera, Sitophilus, Tribolium.
2. Identification of fish (up to Sub-Class and Species characters): Cirrhinus mrigala, Labeo bata, Labeo rohita, Labeo calbasu, Catla catla, Channa stratus, Mystus vittatus, Pampus argenteus, Harpadon nehereus, Notopterus notopterus.

Group - C: Field-based Study/ Review Work :
1. Zoology Honours students should complete a Field-based study OR a Review work OR a Term paper on a particular topic within the first two-year tenure of their degree course. If the candidate choose project work, this may be a group work, involving not more than 4 students.
2. Laboratory Note Book must be prepared on day-to-day basis and should be signed by the concerned teacher immediately after the laboratory work. The Laboratory Note Book should contain all the items in the syllabus and must be submitted on the day of examination.
Paper – XII : Practical Paper  100 Marks :  Time : 6 hours

[Questions are to be set with Four experiments: A) Microtomy (from Group – A : 15 marks),
B) Chi-square test (from Group – A : 10 marks), C) Bacterial staining ( from Group – B : 10 marks),
D) Preparation of gut content for Protozoan Parasites (from Group – B : 15 marks); Identifications of any Five Tissue Sections with reasons (from Group – A : 5X5=25 marks) and Identifications of Two Parasites and One Vector (from Group – B : 3X5=15 marks); Laboratory Note Book (5 marks); Viva voce on Group – C (5 marks)]

Group - A: Histology and Statistical Analysis:

1. Tissue fixation, Embedding, Microtomy, Staining and Mounting of Histological tissue (any one) of white Rat; Demonstration of position of Endocrine glands in Rat.

2. Identification of Mammalian Histological Tissue sections (Liver, Pancreas, Thyroid, Kidney, Adrenal, Testis and Ovary) with Identifying characters.

3. Chi-square Test with concluding remarks.

Group - B: Microbiology and Parasitology:

1. Staining of Bacteria from Curd sample by Gram staining method.

2. Smear preparations and Staining of the Gut-contents of Cockroach and Seminal vesicle of Earthworm for Protozoan parasites.

3. Identification of Entamoeba sp., Giardia sp., Taenia solium, Ascaris lumbricoides (adult male and female), Ancylostoma duodenale (adult male and female), Fasciola sp.


Group - C:

1. Visit to an Agricultural / Sericulture / Fishery / Poultry farm to study equipment and safety measures along with the process and mechanism adopted. A report should be submitted describing the nature of work done.

   OR

   Visit to a Forest ecosystem/Sea-side to study biodiversity. A report should be submitted describing the nature of work done.

2. Laboratory Note Book must be prepared on day-to-day basis and should be signed by the concerned teacher immediately after the laboratory work. The Laboratory Note Book should contain all the items in the syllabus and must be submitted on the day of examination.
**Suggested readings for Practicals (Part-I, Part-II & Part-III):**


